



APPLICATION USER MANUAL

imageEnhance

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Table Of Contents

Table Of Contents.....	3
How This Manual Is Organized.....	7
Overview.....	9
FILTERS AND ALGORITHMS	9
FORMATS & DELAYS.....	11
PACKAGES	12
Installing & Starting.....	13
INSTALLING APPLICATION SOFTWARE FROM CD.....	13
GETTING ASSISTANCE WITH IMAGEENHANCE	13
SERVICING	13
GETTING STARTED WITH YOUR APPLICATION	14
Start-Up Menu	16
APPLICATION KEYS	16
Running an Application	16
Editing Application Keys	17
Deleting Application Keys	17
Setting the Default Application	17
UPGRADING SOFTWARE FROM A CD	18
CALIBRATION OF THE TOUCHSCREEN	18
EDITING THE SYSTEM IP ADDRESS.....	19
SYSTEM INFORMATION	19
Application Interface	21
STANDARD DISPLAY LAYOUT FOR APPLICATION INTERFACE - 2RU	21
STANDARD DISPLAY LAYOUT FOR APPLICATION INTERFACE - 3/6RU	22
STANDARD PLATFORM COLOR ERROR INDICATIONS:.....	24
INPUT / OUTPUT FORMATS.....	25
SCREENLOCK	28
PRESETS	28
PRESETS	29
Presets - 2RU	29
Presets - 3/6RU	30
USER-DEFINED LABELING FOR PRESETS - EXAMPLE.....	30
CONFIGURATION	31
Save, Recall or Rename a Preset.....	31
Save, Recall or Rename a Preset.....	32
KEYBOARD & KNOB INTERFACE	34
Knob Interface.....	34

SD Noise Reduction (IE-SDNR)	36
PROCESSING MENU	36
SOURCE MENU - 6RU	37
Operation	37
User Adjustable Parameters	37
PROC AMP CONTROL MENU	39
DETAIL ENHANCEMENT MENU	40
Operation	40
User Adjustable Parameters	40
NOISE REDUCE - MASTER MENU	41
Operation	41
User Adjustable Parameters	41
ADAPTIVE MEDIAN "SPIKE" FILTER	42
Operation	42
User Adjustable Parameters	42
BRICKWALL FILTER	43
Operation	43
User Adjustable Parameters	43
TEMPORAL RECURSIVE FILTER	45
Operation	45
User Adjustable Parameters - Manual or Auto Mode	45
User Adjustable Parameters - Manual Mode (Temporal Recursive Filter)	46
User Adjustable Parameters - Automatic Mode (Temporal Recursive Filter)	48
 SD Noise Reduction with Grain Reduction (IE-SDNR-G)	 49
PROCESSING MENU	49
PROC AMP CONTROL MENU	50
DETAIL ENHANCEMENT MENU	51
Operation	51
User Adjustable Parameters	51
NOISE REDUCE - MASTER MENU	52
Operation	52
User Adjustable Parameters	52
GRAIN FILTER - 2RU	53
Operation	53
User Adjustable Parameters	53
BRICKWALL FILTER	54
Operation	54
User Adjustable Parameters	54
TEMPORAL RECURSIVE FILTER	56
Operation	56
User Adjustable Parameters - Manual or Auto Mode	56
User Adjustable Parameters - Manual Mode (Temporal Recursive Filter)	57
User Adjustable Parameters - Automatic Mode (Temporal Recursive Filter)	59
 HD Noise Reduction (IE-HDNR)	 60
PROCESSING MENU - 6RU	60
PROC AMP CONTROL MENU - 6RU	61

DETAIL ENHANCE MENU - 6RU	62
Operation.....	62
User Adjustable Parameters	62
NOISE REDUCE - MASTER MENU - 6RU	63
Operation.....	63
User Adjustable Parameters	63
BRICKWALL FILTER - 6RU	64
Operation.....	64
User Adjustable Parameters	64
TEMPORAL RECURSIVE FILTER - 3RU & 6RU	66
Operation.....	66
User Adjustable Parameters - Manual or Auto Mode	66
User Adjustable Parameters - Manual Mode (Temporal Recursive Filter)	67
User Adjustable Parameters - Automatic Mode (Temporal Recursive Filter)	69
Cine Maker (IE-SDFL)	70
PROCESSING MENU	70
CONVERSION MENU.....	71
Operation.....	71
User Adjustable Parameters	71
PROC AMP CONTROL MENU.....	72
PROC AMP CONTROL MENU.....	72
COLORSPACE MENU	73
CUSTOM COLORSPACE MENU.....	74
DETAIL ENHANCEMENT MENU	75
Operation.....	75
User Adjustable Parameters	75
GRAIN INSERTION MENU	76
Operation.....	76
User Adjustable Parameters	77
MPEG Artifact Removal (IE-MPEG-AR)	78
PROCESSING MENU	78
PROC AMP CONTROL MENU.....	79
ADVANCED APERTURE CORRECTION MENU	80
Horizontal/Vertical Controls.....	80
Filters	81
Basic Filter Layout	81
Filter Controls	81
Slope	83
Coring	83
Affects on Image Quality	83
NOISE REDUCE - MASTER MENU	84
Operation.....	84
User Adjustable Parameters	84
BRICKWALL FILTER	85
Operation.....	85
User Adjustable Parameters	85

TEMPORAL RECURSIVE FILTER	87
Operation.....	87
User Adjustable Parameters - Manual or Auto Mode	87
User Adjustable Parameters - Manual Mode (Temporal Recursive Filter)	88
User Adjustable Parameters - Automatic Mode (Temporal Recursive Filter)	90
MOSQUITO	91
Operation.....	91
User Adjustable Parameters	91
System Setup Menu	92
INPUT VIDEO MENU - 2RU	93
OUTPUT VIDEO MENU - 2RU	94
REFERENCE	95
Reference Menu Options:.....	95
Reference Menu Error Indications:.....	95
AUDIO	96
Audio Menu Error Indications:	96
TIMECODE.....	97
FILL SHADE - 2RU	98
GPI MENU	99
KNOB & DISPLAY - 2RU	100
Programming the knob:.....	100
Adjusting the Display Brightness	100
POWER MENU - 2RU	101
KEYED PRODUCT OPTIONS	102
SYSTEM INFO	103
2RU	103
3/6RU	103
CONVERSION DECISION LIST	104
CONVERSION DECISION LIST MENU	105
Conversion Decision List Operation.....	106
CDL Example	107
Offline Script Editing	108
Enhanced CDL (3/6RU only).....	108
EXIT	110
OK	110

How This Manual Is Organized

This User Manual covers all of the applications of the imageEnhance family:

- IE-SDNR - Standard Definition Noise Reduction
- IE-SDNR-G - Standard Definition Noise Reduction with Grain
- IE-HDNR - Standard & High Definition Noise Reduction
- IE-SDFL - Cine Maker Processing Software
- IE-MPEG-AR - SD MPEG Artifact Removal and Noise Reduction

This manual is organized so that topics common to one or more applications - such as the Start Up Menu, application interface and System Setup Menu - are grouped together in separate sections, and topics unique to an application are in other sections.

To completely understand the menus available in a specific application the user will need to refer to multiple sections - several sections that are general, and one that is specific to the application in use.

The sections on specific applications contain full descriptions of each menu for that application. This results in some duplication of descriptions, but results in having all of the application specific information being contained in a single section rather than spreading it throughout the manual.

Some of these applications are available only on certain hardware configurations. Where this is the case, only menus for the configuration supported will be shown. For those applications available on multiple configurations, menus will be shown that reflect the implementation of those menus on all the system configurations.

The following is a brief description of the content of each major section of this manual. Use these descriptions to help you determine what part or parts of the manual you need to review to operate the system.

Overview

This section has a general description of filters and algorithms used in the imageEnhance applications, a table showing the formats supported by the various applications and delays in the signal that occur for the different applications and a description of the applications themselves.

Installing & Starting

This section covers how to install software on the system and how to start up the application.

Start Up Menu

This section covers the Start Up menu and its functionality. From this menu software keys are created or modified, new software can be loaded, the touchscreen can be calibrated and an IP address for the system can be created.

Application Interface

This section covers the overall design of the interface and provides a guide to where general information will appear and where to expect application specific menus and information to appear.

SD Noise Reduction (IE-SDNR)

This section covers the Standard Definition Noise Reduction software application, its menus and descriptions on how to use the controls for each menu.

SD Noise & Grain Reduction (IE-SDNR-G)

This section covers the Standard Definition Noise Reduction (with Grain) software application, its menus and descriptions on how to use the controls for each menu.

HD Noise Reduction (IE-HDNR)

This section covers the Standard & High Definition Noise Reduction software application, its menus and descriptions on how to use the controls for each menu.

Cine Maker (IE-SDFL)

This section covers the Cine Maker application - available in Standard Definition only - its menus and descriptions on how to use the controls for each menu.

MPEG Artifact Removal (IE-MPEG-AR)

This section covers the MPEG Artifact Removal & Noise Reduction software application, its menus and descriptions on how to use the controls for each menu.

System Setup Menu

This section covers the functionality of the System Setup Menu. This menu is related to hardware capabilities of the system and is different for the 2RU versus the 3 & 6RU configurations. This menu covers GPI interfaces, Reference input, Audio input, Timecode detection, Keyed Product Options, System Info and Conversion Decision Lists (CDL).

Overview

Filters and Algorithms

DCR - Proprietary Detect, Classify and Replace Algorithms

Only available from Teranex, imageEnhance with DCR algorithms make projects noise reduction, pre-compression processing, and DVD Mastering more manageable.

- **DETECT** - The detect phase of DCR utilizes proprietary algorithms to automatically detect and differentiate specific artifacts from object edges and other desirable elements in the scene.
- **CLASSIFY** - Artifact candidates are then classified against known characteristics to eliminate false detections.
- **REPLACE** - A proprietary algorithm replaces the identified artifact with information from the surrounding area.

Film Look

Several factors contribute to what is perceived as film-look material. Film's frame rate, the film stock's grain structure and film's exposure latitude give a distinctive appearance to film captured material.

Film Look combines powerful temporal processing, grain insertion, and colorspace processing algorithms from Teranex to enable the conversion of video based material to a film-look.

The temporal processing performed by Cine Maker gives motion the distinctive appearance of film while maintaining maximum image resolution. PixelMotion de-interlacing of video originated material produces perfect 24 frame per second progressive frames from 25 or 30 frame per second material in preparation for further processing. The processing aperture is adjusted on a pixel-by-pixel basis, which preserves all of the detail of the original interlaced image and eliminates jaggies in the output image. After the processing, a 2:2 sequence is inserted for 25-frame material and a 2:3 sequence is inserted for 30-frame material.

Grain can be inserted into the image to further enhance the appearance of film. Controls that adjust the intensity and type of grain enable the desired look to be dialed in.

Color processing is enhanced through colorspace manipulations. The user can select from preprogrammed conversions or make custom adjustments to match a desired look.

Grain Reduction

Grain reduction is accomplished through a spatial filter designed to reduce grain without introducing artifacts typical in other grain reduction systems. This filter offers controls to enable the use of an intensity characteristic of the specific film stock.

Noise Reduction

Advanced noise reduction controls offer a greater degree of temporal recursive noise reduction with fewer artifacts. For greater control, the filter operates in both automatic and manual modes. In auto mode, the system analyzes the input and applies the noise reduction setting based on the detected noise and degree of motion in the image. A bias control allows the auto mode aggressiveness to be fine-tuned. In manual mode, users have controls to adjust the recursion for both static and motion areas of the image plus a threshold setting controls the sensitivity of the noise reduction to motion vs. noise.

MPEG Artifact Removal

imageEnhance MPEG Artifact Reducer removes DCT compression artifacts common to MPEG, JPEG and DV material. As content providers increase their channel offerings, the bandwidth or the amount of data distributed for each channel is decreased thus increasing MPEG artifacts. Teranex's MPEG-AR filter removes artifacts, while leaving the detail of the image intact. This allows content distributors to increase their channel capacity and maintain the overall quality of their product.

Detail Enhance

Based on a traditional film compositing technique called "Unsharp Masking." This edge-sharpening filter allows for both positive and negative aperture correction.

Advanced Aperture Correction

As an optional enhancement, Advanced Aperture Correction provides unprecedented control and flexibility to increase perceived picture sharpness and detail. Independent horizontal and vertical filters have controls for the cutoff and slope of High Boost, High Cut, and Peak filters. A Coring control determines the aggressiveness with which these filters are applied.

Intuitive Gauges and User Controls

ImageEnhance is flexibility allows you to "dial-in" the correct amount of scratch, dirt and noise detection for a particular scene or program. The Gauge displays provide instant and intuitive feedback to see the effect of adjustments.

For noise reduction the pixels identified as being in motion are shown with a red overlay.

3:2 Pull-down Handling

Designed as a built-in feature, Teranex's superior 3:2 pull down handling correctly recognizes and removes the sequence to bring the source back to the original 24 frames. For 480i59.94 and 1080i59.94 material, a new 3:2 sequence is inserted after processing.

Scene Change Detection

imageEnhance eliminates mixed frames by preventing information from one scene affecting the processing in the next scene.

Time Code & Audio Handling

Proper handling of audio and time code ensures that synchronization is maintained throughout the processing cycle.

Enhanced Conversion Decision List Processing

Easy-to-use controls capture all processing parameters based on time code allowing processing parameters to be fine-tuned on a scene-by-scene basis. These parameters are then applied on a frame accurate basis to the source material.

Formats & Delays

The imageEnhance family of applications supports the following formats.

Application	Input / Output	Delay (frames)	Available Platforms
SD Noise Reduction	480i59.94	5	2RU, 3RU, 6RU
	576i50		
SD Noise Reduction /w Grain Reduction	480i59.94	5	2RU
	576i50		
HD Noise Reduction	1080i50	5	6RU
	1080i59.94		
SD Cine Maker	480i59.94	5	2RU
	1080p24		
MPEG Artifact Removal	480i59.94	5	2RU
	576i50		

In addition to showing the formats supported by each application, the table shows the number of frames of delay and the platforms upon which these applications run.

Packages

The imageEnhance families of applications are available in the following configurations

IE-SDNR	imageEnhance - SD Noise Reduction/Pre-Compression Processing Software Includes: Brickwall Filter and Temporal Recursive Filter.
IE-SDNR-G	imageEnhance - SD Noise Reduction/Pre-Compression Processing/Grain Reduction Software Includes: Grain Reduction, Brickwall Filter and Temporal Recursive Filter.
IE-HDNR	imageEnhance - SD/HD Noise Reduction/Pre-Compression Processing Software Includes: Brickwall Filter and Temporal Recursive Filter Software.
IE-SDFL	imageEnhance - Cine Maker Processing Software Includes: Temporal Processing, Grain Insertion, Colorspace Processing, and Variable Aspect Ratio Conversion.
IE-MPEG-AR	imageEnhance - SD MPEG Artifact Removal and Noise Reduction Includes: MPEG Artifact Removal, Brickwall Filter, Temporal Recursive Noise Reduction, and Advanced Aperture Correction

Installing & Starting

Installing Application Software from CD

Teranex Video platforms come pre-loaded with your purchased application software. However, if the need arises to install new or upgrade old application software, loading software from CD may be required. Please refer to the "Teranex Video Computer Installation and User Manual" section on upgrading from CD if you need to install software.

Getting assistance with imageEnhance

This manual will help you get started with the imageEnhance application. It provides an overview of features and procedures for the tasks you can perform using this application.

However, if you need further assistance please contact:

24-hr Technical Support Phone:

For US & Canada:	877.2.TERANEX (877.283.7263)
International:	1.407.858.6000

Technical Support e-mail: support@teranex.com
Technical Support web site: www.teranex.com/support

Servicing

Only authorized service personnel should open the unit. Disconnect AC sources to the power supply(s) before servicing.

Getting started with your application

Automatic load of the factory-set Default Application

Your system has been shipped with one of the Teranex software applications selected as a default to automatically start at power-on.

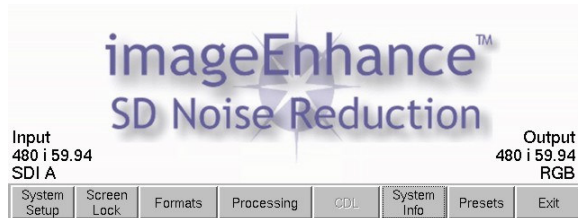
The following describes the power-on & start up sequence for the Teranex system. The user will only see two screens while the system is starting; after which the app is ready to use.

Power-On & Start Up Sequence:

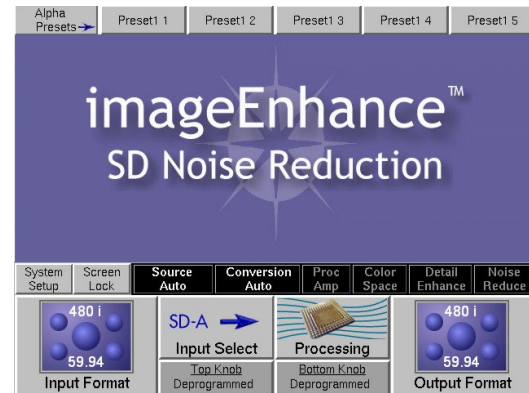


1st Screen - Autoload - During the power-on & start up sequence, the Autoload display screen will be in view for 5 seconds. DO NOT TOUCH THE SCREEN if you want the system to load the default app.

However, if you want to change from your current defaulted application and select another Teranex software application, then press the "Press To Cancel Autoload" button. This will take you to the Start-Up menu where you can select your desired application or select a new default application. See the "Setting the Default Application" section for instructions on how to set a new default application.



2RU

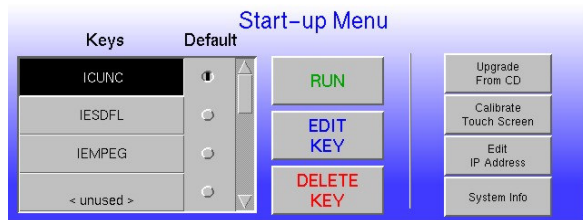


3/6RU

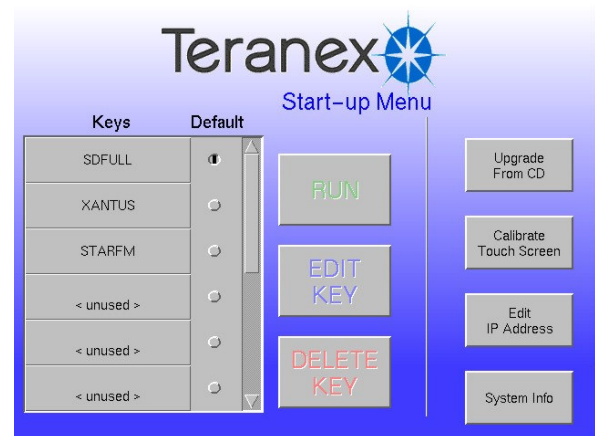
2nd Screen - Application Screen - If imageEnhance or one of the applications within the imageEnhance family is your factory default application; the system will then bring up that Application Main Splash Screen. Your application is then ready to use.

Start-Up Menu

The Start-up Menu is shown if the “Press to Cancel Autoload” button is pressed on the Autoload screen, or if a running application has been stopped by using the Exit button. The Start-up Menu is shown below:



2RU



3/6RU

From this screen a number of things can be done:

- Run a selected Application
- Edit the software key for an application
- Delete a software key
- Upgrade the system from a CD
- Calibrate the touch screen
- Edit the IP address of the system
- Get system information

Application Keys

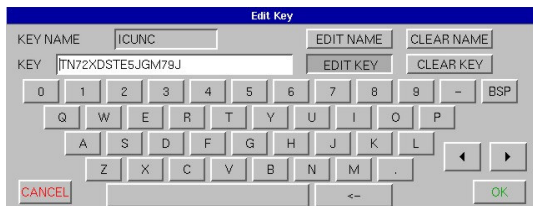
The scrolling list of application keys on the left side of the screen allow up to 12 applications to be started from this screen. Since some application features are optional it is possible to create two or more buttons for the same basic application, but each button may invoke a software key that enables different application options.

Running an Application

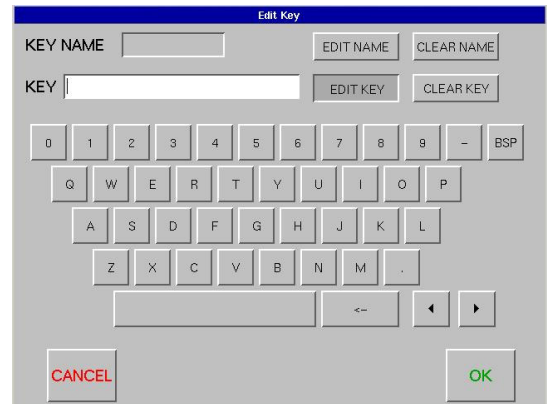
To run an application from the scrolling list, select the button by pressing on it, and then press the Run key.

Editing Application Keys

To enter a new application key or modify an existing key, select the application button and press the "Edit Key" button. This will bring up a screen where both the key name and the key itself can be entered.



2RU



3/6RU

Enter in the desired name for the key and the 16-character key for the application and press the "OK" button. Normally software keys are sent out via email or mail and contain a space after every four characters for legibility reasons. When entering the key into the system do not include the spaces.

Key names can be a maximum of 6 characters long.

Deleting Application Keys

To delete an application key, simply select the button to be removed and press the "Delete Key" button.

Setting the Default Application

One application on the system can be set to automatically start if the "Press to Cancel Autoload" button is not pressed. This default application is selected by choosing the small circular button next to the desired application. A small pop-up window will appear and ask that you confirm that this is the choice for the default application. After pressing "Yes", this application will now become the default application.

Upgrading Software from a CD

Upgrades to the system software are distributed on CD-ROMs. To upgrade the software, place the CD-ROM into the CD-ROM drive and make sure that this drive is connected to the system.

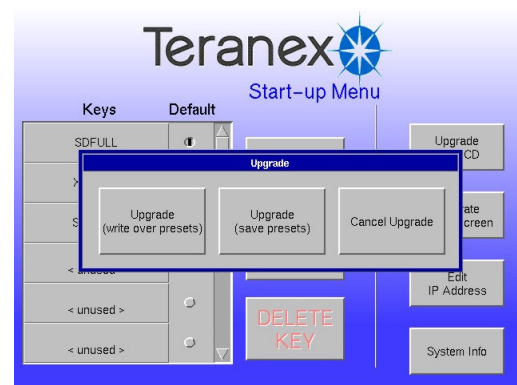
For the 6RU chassis, a CD-ROM drive is inside the chassis on the right hand side. Simply swing open the front bezel of the system after loosening the four captive screws and place the CD-ROM into the drive. Wait for a few seconds to while the drive and system recognize that a disk has been installed and then the upgrade process can begin.

For the 3RU and 2RU systems, an external USB-based CD-ROM must be used. It is possible to connect the external CD-ROM drive to the system while it is powered up, but the system must be powered off, then on again, before it will recognize that the CD-ROM drive is connected to the system. Once the system is up and at the Start-Up Menu again, the upgrade process can begin.

Click on the "Upgrade From CD" button to start the upgrade process. You will have three options at this point - upgrade and write over any existing presets, upgrade and save any existing presets, or cancel the upgrade process - as shown in the illustrations below.



2RU



3/6RU

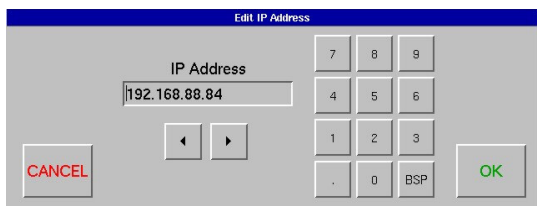
Calibration of the Touchscreen

Pressing the "Calibrate Touch Screen" button will launch a series of menus where cross-hairs will appear in each of the four corners of the touch screen. Press on the center of each cross hair and the next one will appear. After the four in the corners are finished, a cross hair will appear at the center of the screen. Press this cross hair to complete the calibration process.

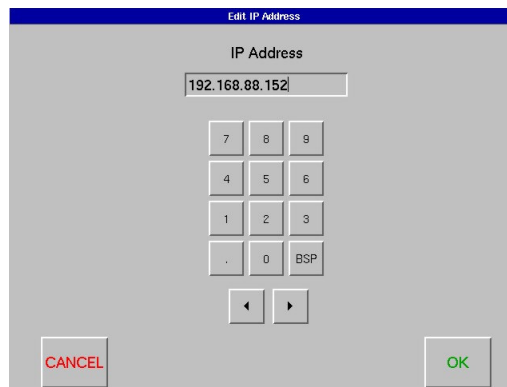
Editing the System IP Address

The system can be controlled via a remote control application by using the Ethernet connection. To do this, an IP address must be defined for the system. The system must have a static IP address set for it, it will not automatically configure an IP address on networks with DHCP servers.

To edit the IP address, press the "Edit IP Address" button. The following screen will appear:



2RU

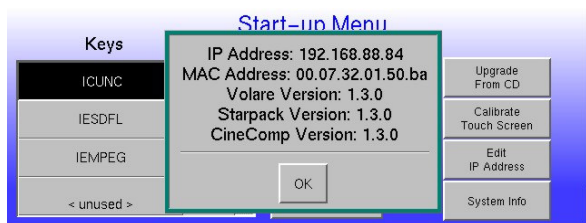


3/6RU

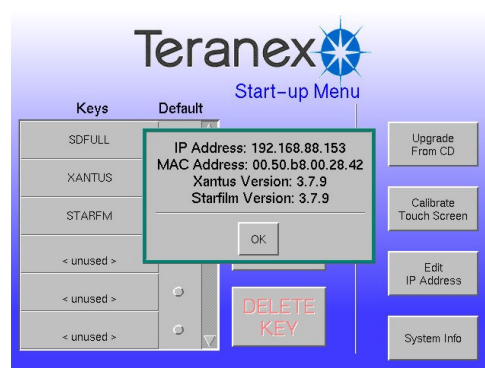
The default IP address for systems shipped from the factory is: 192.168.88.152. For proper operation of the system on a Local Area Network, the subnet mask of the Local Area Network must be 255.255.255.0.

System Information

Pressing the "System Info" button will cause the System Info screen to appear:



2RU



3/6RU

This menu shows the software version of the major applications on the system as well as the IP address and the MAC address.

The IP address (as set in "Editing the System IP Address" on page 19) is important to know for establishing a network connection to the system.

The MAC address is also a networking parameter that is not normally referenced, but is important for the system because the keys that unlock the software on the system are based on this number. Should additional software applications or options be ordered for the system, you may be asked to confirm the last four characters of the MAC Address. This is one of the two places where this can be seen. The other is in the System Setup Menu - see "System Info" on page 103 for this.

Application Interface

This chapter describes the display screen layouts & functionality that are standard for Teranex applications. With this standard, the user can expect a common user-interface, with an intuitive, user-friendly application interface when using the imageEnhance applications.

Standard Display Layout for Application Interface - 2RU

The touchscreen is divided into four functional areas. Area 2 will be the area to find application specific menus. Area 2, 3 and 4 are common for all software applications.



The touch screen is divided into four functional areas:

Area 1 - The first area is the general splash area. This area is used to display the various processing menus

Area 2 - The second area of the display is used to show the currently selected input and the input and output formats. This area will also shown diagnostic information if the input is lost or incorrect.

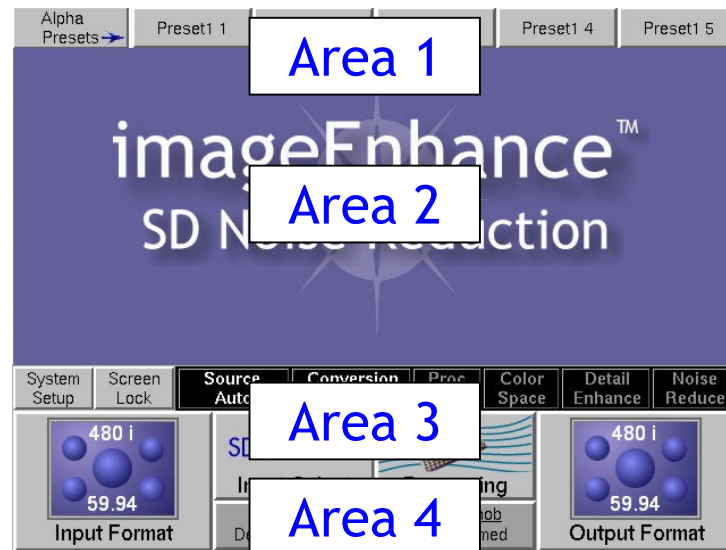
Area 3 - The third area contains the buttons used to access the various system menus

- | | |
|----------------|---------------|
| - System Setup | - CDL |
| -Screen Lock | - System Info |
| - Formats | - Presets |
| -Processing | - Exit |

Standard Display Layout for Application Interface - 3/6RU

The touchscreen is divided into four functional areas. Area 2 will be the area to find application specific menus. Area 1, 3 and 4 are common for all software applications.

The screen below shows a generic screen layout.



Area 1 - Presets - The Preset function provides the user a way to **save or recall** parameter settings to and from memory.

Area 2 - App Menu - This area of the display (the area below the presets) is used to display the various menus for any Teranex software application the user selects.

Area 3 - The third area, shown below, contains the System Setup Button, Screen Lock Button and Status Indication Area Displays.



Area 3 - Soft Keys

(a) System Setup - Opens the Setup Menu

The Setup Menu allows the user to verify installed options, setup GPI's, choose the Genlock Reference Source, and perform other basic setup functions. Refer to the "Video Computer User Manual" for details on System Setup Menu.

(b) Screen Lock - Opens the Screen Lock Menu

See the Screenlock section for a description of this function.

(c) Status Indication Area - (c through h)

The status area (see above) has a text display for each of the processing menus/options.

Normally these text displays will be gray. If a change is made to one of the menus, causing the unit to be in a non-standard mode, the text will be shown in yellow.

Depending on the configuration of the system purchased, pressing on the text displayed in status indication bar will cause the corresponding processing menu to be displayed in Area 2 of the touchscreen.

Area 4 - The Main Control buttons are located in the lower portion of the display screen. There are 4 main control buttons and two programmable Rotary Knobs (left/right for the 6RU Video Computer and top/bottom for the 3RU Video Computer).

Standard Platform Color Error Indications:

There are four colors use to indicate system active or errors. The colors utilized are: gray, green, yellow and red. The colors have the following meanings:

Input Select Button (System Setup Menu - 2RU)

- **GRAY** - An input is selected and valid
- **GREEN** - Not Applicable
- **YELLOW** - If the input select button is yellow, then the unit has detected an input signal, but it is not valid, based on the currently selected input.
- **RED** - Indicates that no input has been detected

Reference Tab (System Setup Menu)

- **GRAY** - An input is selected and valid
- **GREEN** - Not Applicable
- **YELLOW** - If the input select button is yellow, then the unit has detected an input signal, but it is not valid, based on the currently selected input.
- **RED** - Indicates that no input has been detected

Audio Tab (System Setup Menu)

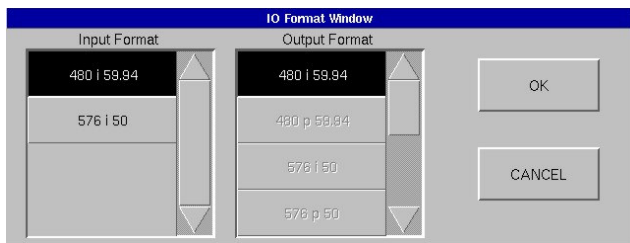
- **GRAY** - An input is **selected** and valid
- **GREEN** - Not **Applicable**
- **YELLOW** - If the **input** select button is yellow, then the unit has detected an input signal, but it is not valid, based on the currently selected input.
- **RED** - Indicates that no input has been detected

User Presets (System Setup Menu - 2RU)

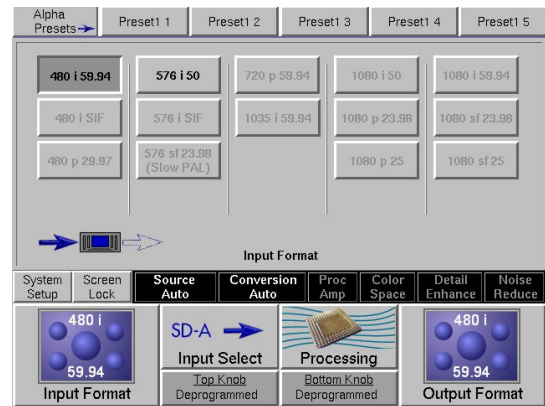
- **GRAY** - **Indicated** that the preset is not active
- **GREEN** - **Indicates** that the preset is active
- **YELLOW** - If changes have been made to the system after the preset has been selected, then the Preset button will show yellow.
- **RED** - Not **Applicable**

Input / Output Formats

Input Format - Pressing the Formats button on the 2RU or the Input Format button on the 3/6RU opens a menu, which allows the user to select the desired input format.

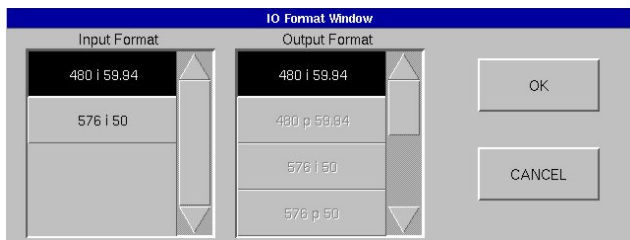


2RU

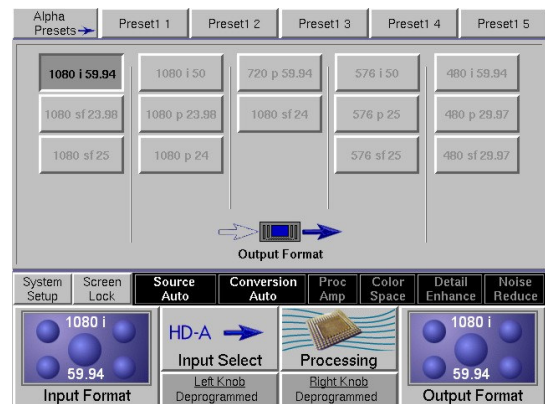


3/6RU

Output Format - Pressing the Formats button on the 2RU or the Output Format button on the 3/6RU opens a menu, which allows the user to select the desired output format.



2RU



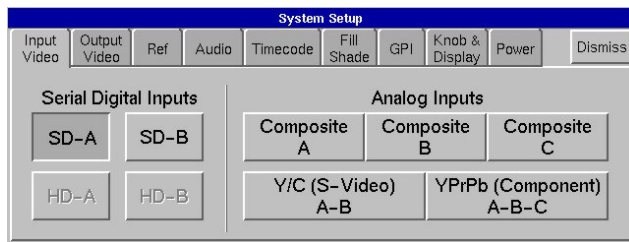
3/6RU

The 2RU platform uses the same menu to select the input and output formats. When using the 2RU Formats menu, select the input format first and the available output formats will be highlighted on the list of output formats. Then choose the output format and press the "OK" button to enable these formats.

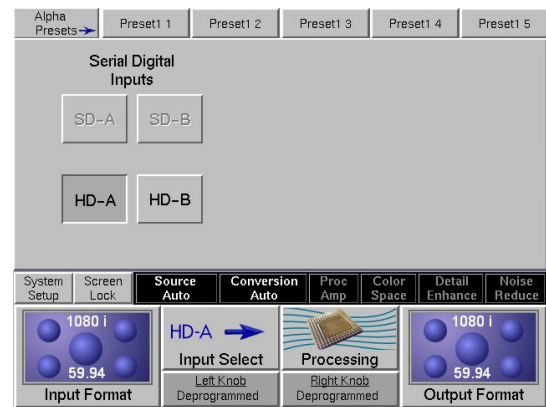
When using the 3/6RU, first press the Input Format button, select the desired input format and press the "OK" button, then press the Output Format button. This will show the list of available output formats for the chosen input format. Select the desired output format, and then press the "OK" button.

Input Select

Pressing this button will open a menu that will show the currently selected input. Once an input is selected, the button will indicate the active input (e.g. HD-A, HD-B, etc.).



2RU



3/6RU

Note: The Input Video selection menu on the 2RU Video Computer is located under the System Setup menu.

Serial Digital Inputs

SD-A - Select standard definition, SDI input A
SD-B - Selects standard definition, SDI input B

HD-A - Select high definition, HD-SDI input A
HD-B - Selects high definition, HD-SDI input B

Note: HD-SDI input on the 2RU Video Computer is not currently supported

On the 2RU the Input Video menu as shown above is also used to select an analog video input. For information about selecting analog inputs on the 2RU, consult the Input Video menu in the System Setup Menu section of this manual.

The color of the Input Select button will indicate the status of that input.



GRAY - an input is present and valid.

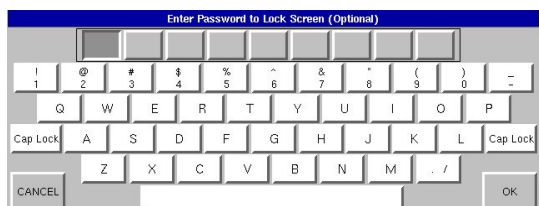


YELLOW - the unit has detected an input signal, but it is not valid based on the currently selected input format.

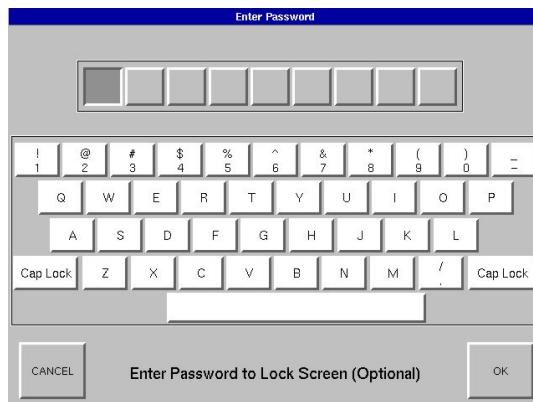


RED - indicates that no input has been detected.

Screenlock



2RU



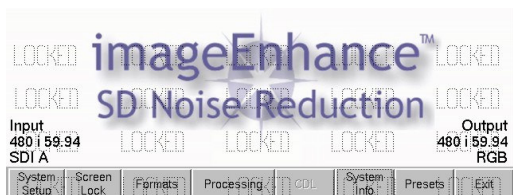
3/6RU

The Screen Lock menu disables touchscreen control, preventing changes to system operational parameters. Press “Cancel” if you wish to cancel this operation. This feature allows for an OPTIONAL password to be set to prevent unauthorized access.

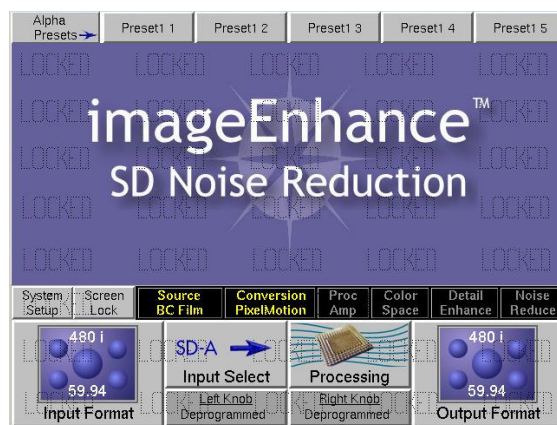
If you want to **lock** the screen to prevent accidental changes in parameters, simply press the screen lock button. The Screen Lock Keyboard will then be displayed. The user can then either click “OK” to lock the screen without entering a password, or enter a password and click “OK”. The normal splash screen will appear with the word “LOCKED” in the background as shown below. Setting a password provides the user with additional security.

To **unlock** the system, touching anywhere on the screen will bring up the keyboard. Use the touchscreen keyboard to enter a password up to nine-characters in length. Setting a password provides the user with additional security.

Note: If a password is used, please be sure to record the password in a safe place, in case the password is forgotten.



2RU



3/6RU

Presets

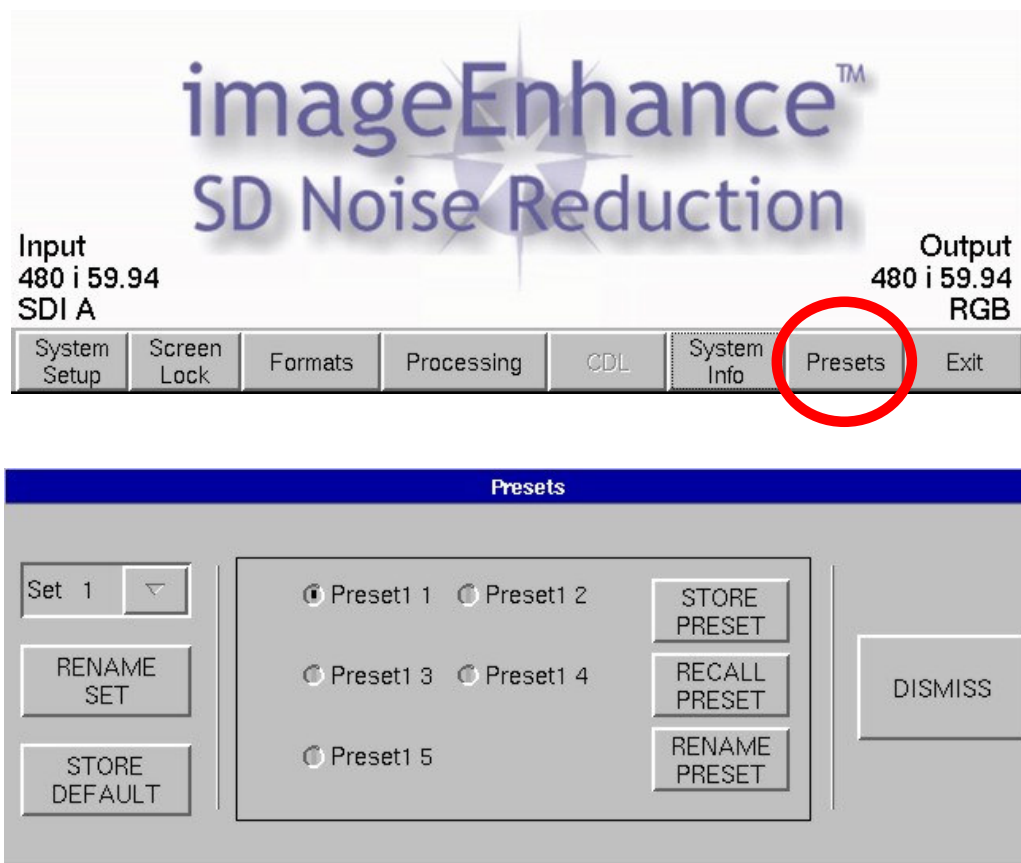
The Preset function provides the user a way to **save or recall** processing parameter settings to memory. On the 3/6RU these presets are located in a drop-down menu that is keyed-off of the upper left-most button (the one with the arrow). On the 2RU, the presets can be accessed from the Presets button on the main screen.

There are a total of 41 presets, 40 user and 1 master, that can be used in this system. The user presets are setup in 8 groups (Sets) of 5 presets. The master preset is called 'Store Current'

There are three reasons it is important to save the user-defined parameter settings:

- Parameter settings are needed for future use
- In case of power failure
- In situations requiring system restart

Presets - 2RU



Store Preset - Will store the current system setup in the selected Set and Preset. For example pressing Store Preset in the GUI image above would save Preset 1 of Set 1.

Recall Preset - Will load the stored setting of the currently selected Set/Preset.

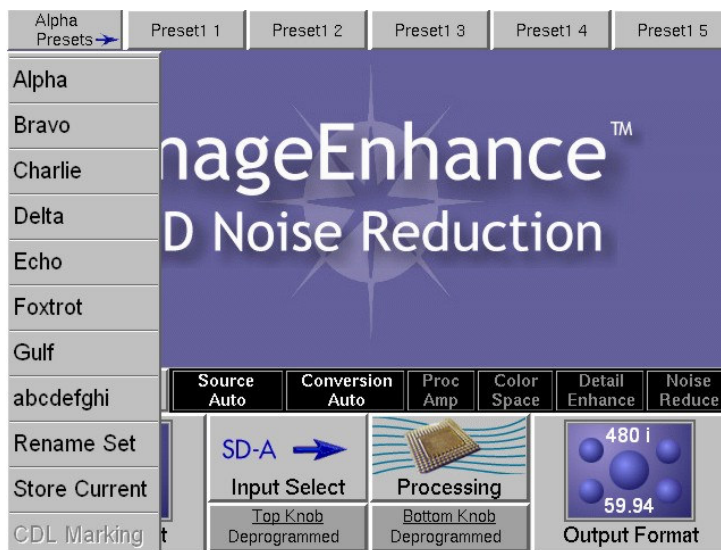
Rename Preset - Will allow the user to name the current Set / Preset.

Dismiss - Returns the user to the main screen.

Presets - 3/6RU

Location of Preset drop-down menu

Along the top of the display are five preset buttons and one Set selection button



- By pressing and holding the, currently named, "Set 1 Preset →" button will expose the drop-down menu.
- Pressing the button will expose a list of 8 User groups - Set 1 through Set 8.
- Each group has five user definable presets - Presets 1 through Preset 5.
- The extra (1) Master Preset called "Store Current" is just above the CDL Marking button at the bottom of the drop down menu.

User-defined Labeling for Presets - Example

Each of the group Sets and the individual Presets can be edited and renamed with a user-defined label. The table below shows and example of presets with user defined names:

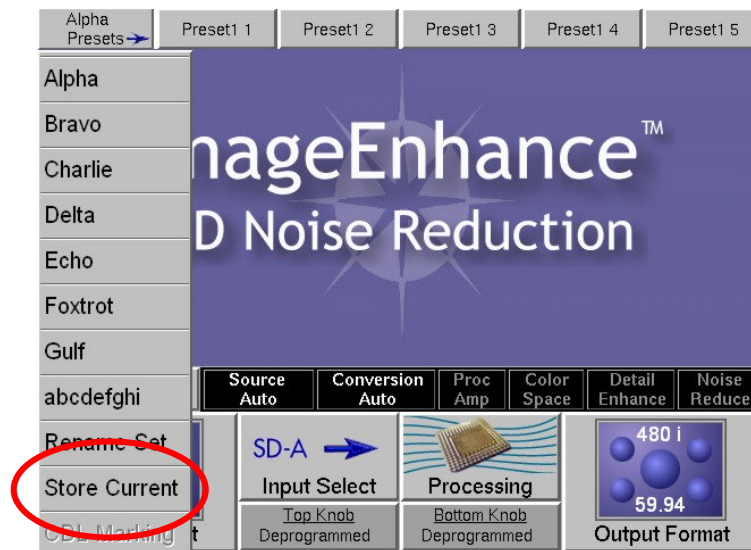
Film 1	Interior	Ext Day	Ext Nite	PRESET 4	PRESET 5
Film 2	PRESET 1	PRESET 2	PRESET 3	PRESET 4	PRESET 5
HD 3	PRESET 1	PRESET 2	PRESET 3	PRESET 4	PRESET 5
SET 4	PRESET 1	PRESET 2	PRESET 3	PRESET 4	PRESET 5
SET 5	PRESET 1	PRESET 2	PRESET 3	PRESET 4	PRESET 5
SET 6	PRESET 1	PRESET 2	PRESET 3	PRESET 4	PRESET 5
SET 7	PRESET 1	PRESET 2	PRESET 3	PRESET 4	PRESET 5
SET 8	PRESET 1	PRESET 2	PRESET 3	PRESET 4	PRESET 5
Store Current					

Configuration

The Store Current preset allows the user to store a system configuration that will be used if the system loses power or is restarted.

To Store the Current Settings and Configuration:

- Press the gray **"Set"** button at the top left of the display to open the pull down User Set menu. (See illustration below.)
- At the bottom of the User Set pick list, press the button labeled **"Store Current"** to save the current state of the Video Platform configuration.
- The current configuration will now be restored if power is turned off or if power is accidentally lost to the unit.



Save, Recall or Rename a Preset

To access the User Presets, press the Presets button (top left). Pressing the button will expose a list of 8 User groups. Each group has five user definable presets, yielding a total of 40 user presets.



To Save a User Preset:

- Press the Set button at the top left of the display to open the pull down User Set list.
- Select the Set from 1 - 8 into which you would like to save the current configuration
- Select the specific User Preset button (1 - 5) to which you'd like to save the current.
- A pull down menu will be displayed (see above) with the options to Store, Recall or Rename the selected preset button.
- Select Save.

To Recall a User Preset:

- Press the Set button at the top left of the display to open the pull down User Set list.
- Select the Set from 1-8 from which you would like to recall a configuration.
- Select the specific User Preset button (1 - 5) that holds the configuration you would like to recall.
- A pull down menu will be displayed (see above) with the options to Store, Recall or Rename the selected preset button.
- Select Recall.
- When the preset is selected the corresponding button will change to green to show that the preset is active.
- If any changes are made to the system after a preset has been selected the Preset button will show Yellow.

To Rename a User Preset:

- Press the Set button at the top left of the display to open the pull down User Set list.
- Select the Set from 1-8, which you would like to rename.
- Select the User Preset button (1 - 5), which you would like to rename.
- A pull down menu will be displayed (see above) with the options to Store, Recall or Rename the selected preset button.
- Select Rename.
- After selecting Rename, the "Rename a Preset" screen and keyboard will be displayed. Using the keyboard, type in the new name for the Preset button and press "OK".

To Rename a User Set:

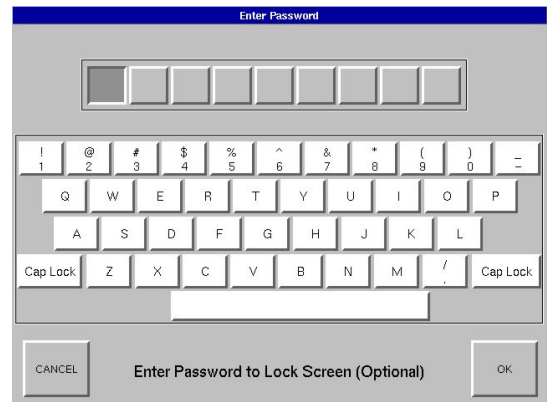
- Press the Set button at the top left of the display to open the pull down User Set list.
- Select the Set from 1-8 that you'd like to rename. This makes the set that you'd like to rename the active Set.
- Again, press the Set button at the top left of the display to open the pull down User Set list.
- Select Rename.
- After selecting Rename, the "Rename a Preset" screen and keyboard will be displayed. Using the keyboard, type in the new name for the Set button and press "OK."

Keyboard & Knob Interface

Keyboard Interface



2RU

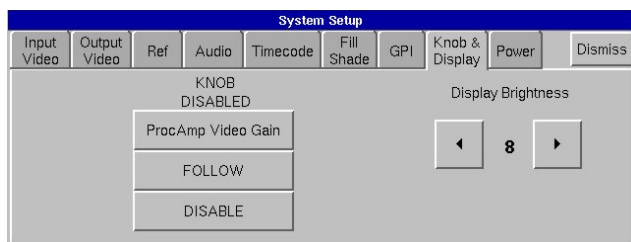


3/6RU

Within the platform is a keyboard display. This keyboard is utilized to enter Passwords when using Screen Lock, renaming presets and entering new software keys (to enable use of new Teranex Software Applications).

Knob Interface

There is one programmable knob on the front panel of the 2RU Video Computer and two programmable knobs on the front panel of the 3RU & 6RU Video Computers. These knobs are rotary encoders and are useful when the touchscreen “sliders” do not provide the fine control desired by the operator.



2RU



3/6RU

Programming the knobs:

The operational mode of each knob can be set independently. There are three modes that are selectable via the pull-down menus activated by pressing the Left Knob or Right Knob Buttons:

Knobs can be in the following modes:

- **Deprogrammed** - The knob is disabled.
- **Follow Mode** - The knob can be assigned 'on the fly.' When the user activates a slider control within one of the menus and then turns a knob, the knob is automatically assigned to that function. If the user then selects another slider control and retouches the knob, the knob will be re-assigned to the new function.
- **Assigned** - Locks a knob to a particular function (e.g.- Proc Amp Video Level). The knob retains this function even when the GUI screen is changed to another mode. To assign a function to a knob, activate the desired slider and then select the "Assigned" mode for the desired knob. The knob will continue to control only this function until the knob is reassigned to Follow Mode or Deprogrammed.

Note: On the 2RU chassis access to the knob menu is made by first going to the System Setup menu, then selecting the "Knob & Display" tab. This menu also controls the brightness of the display on the 2RU. Refer to the System Setup Menu section of this manual for a description of this capability.

Physical Knob Location for 6RU vs. 3RU systems:

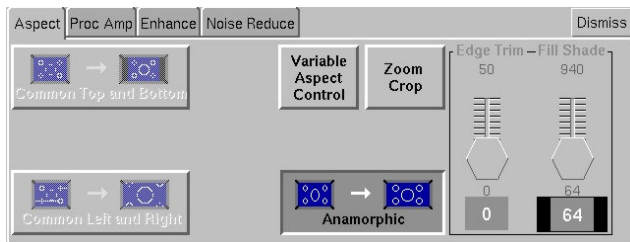
On the 6RU Video Computer, the physical location of the rotary knobs are below the touchscreen display, and are referred to as "Left Knob" and "Right Knob" in the GUI.

On the 3RU Video Computers the physical location of the rotary knobs are to the right of the touchscreen display, and are referred to as "Top Knob" and "Bottom Knob" in the GUI.

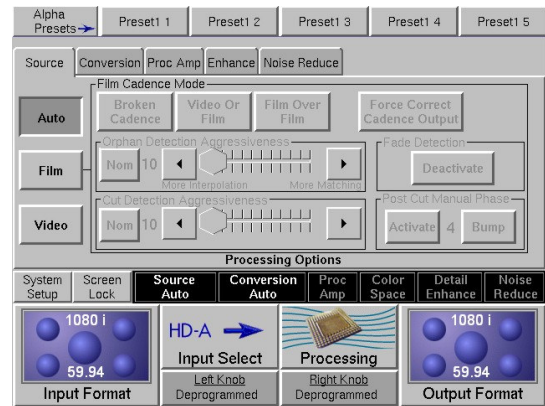
SD Noise Reduction (IE-SDNR)

Processing Menu

The Processing Menu is selected by pressing the **Processing** button. The Processing menu is arranged in a tab control layout in Area 2 of the touchscreen, as shown below. Each menu is selected by pressing the appropriate tab for the function desired along the top of the menu.



2RU

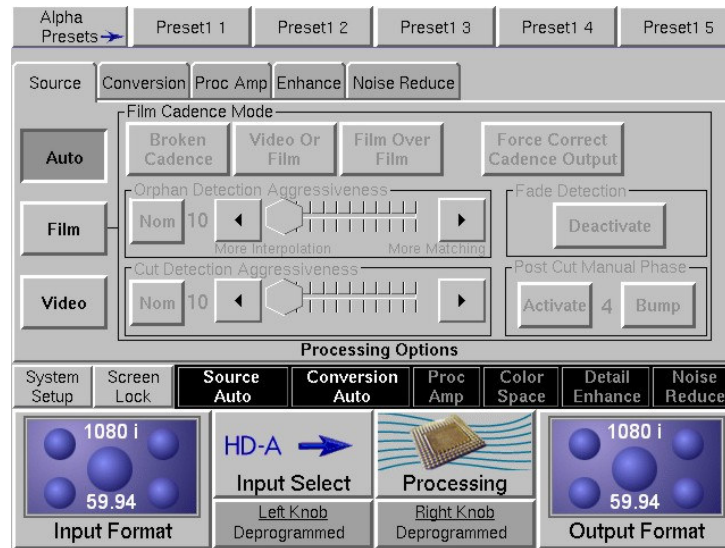


3/6RU

Processing - Pressing this button opens a menu in Area 2 that allows the user to access the following processing menus for the imageEnhance applications:

- Aspect Ratio Conversion
- Source Selection - 6RU Only
- Proc Amp Control
- Detail Enhancement
- Adaptive Median Filter
- Brickwall Filter
- Temporal Recursive Filter

Source Menu - 6RU



Operation

The Source Menu allows the user to define the type of material being input to the unit.

Auto - Allows the Video Computer to automatically determine whether the input source is video or film-based material.

Video - Select this mode when the source material is video-originated. This mode will optimize the algorithms for processing video-originated material.

Film - Select this mode when the source material is film-originated. This mode will optimize the algorithms for processing film-originated material and will provide options for the various cadence issues associated with processing video recordings of film-originated material.

User Adjustable Parameters

Film Cadence Mode:

When **Film** is selected in the Source menu, the user must determine:

- The optimum-processing mode: Broken Cadence, Video Over Film, or Correct Cadence (optional).

Each of these modes is described below.

Force Correct Cadence Output - Not available in the imageEnhance applications.

Broken Cadence Mode - allows to application to be optimized for handling film-originated material that contains an inconsistent 2:3 sequence. It provides access to the user controls listed below:

Orphan Detection Aggressiveness - This control determines how hard the algorithm tries to

make a match between an orphan field and its neighboring fields. At the low end of the control, the algorithm will do more interpolation, which means that an orphan field will be spatially up-sampled to create a progressive frame. The opposite end of the control causes the algorithm to work harder at trying to find a match with one of the neighboring fields.

Cut Detection Aggressiveness - This control sets how large a difference must be present in a scene change before it is interpreted as a "cut." If the control were to be set too low, then simple actions such as a camera pan may be interpreted as a difference between frames and trigger the Cut Detector. Ideally, set the control at the higher end of the range so that only course changes between frames trigger the Cut Detector.

Disable Fade Detection - In most film-originated material, fades are achieved electronically in post-production, rather than performed optically in the film lab. Unfortunately, the process of creating a fade electronically disrupts the 2:3 sequence by causing a change in each field. The process of 2:3 detection, as seen above, occurs by matching fields back together that came from the same film frame. If, however, an electronic fade is applied, there will be a luminance difference in each field, thus making matches difficult. This will cause the system to treat the material as if it were video source material, and will interpolate the frames during the fade to prevent any artifacts from occurring.

There may, however, be occasions when it is felt a better result would occur by allowing the system to continue to try to treat the material as film, thereby trying to match fields to create the progressive frames. The **Disable Fade Detection** mode allows the user to *turn off* fade detection so that the algorithm will continue to treat this material as film.

Post-Cut Manual Phase - When a cut occurs in the source material, the system must re-establish the 2:3 sequence after the cut. Depending on where the cut occurs, the new sequence after the cut may be starting on an A, B, C, or D frame. There may be cases where the system will get confused in selecting the correct new sequence. If this occurs, the Post Cut Manual Phase control allows the user to manually start the new sequence at the correct phase by bumping the phase to either an A, B, C, or D frame.

Video Over Film - optimizes the unit for use with material that is film-originated, but has 30-frame video content overlaid.

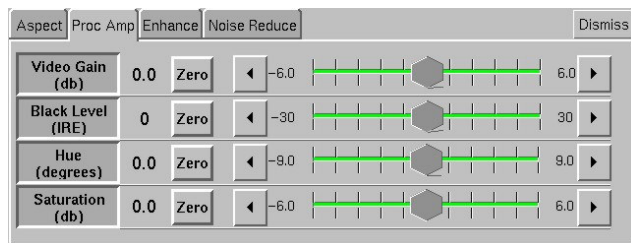
Cadence Detection Aggressiveness - The effect of having 30-frame video information laid over film-originated material is that each field will now appear to be different. This difference can make the ability to detect the underlying 2:3 sequence more difficult, as no two fields will now match perfectly.

The Cadence Detection Aggressiveness control determines how hard the algorithm will work at detecting the 2:3 sequence. At the low setting, the unit will do more interpolation or tend more towards treating the material as video. The opposite end will allow the algorithm the work harder at detecting the film sequence, thereby allowing it to treat the material as film more often.

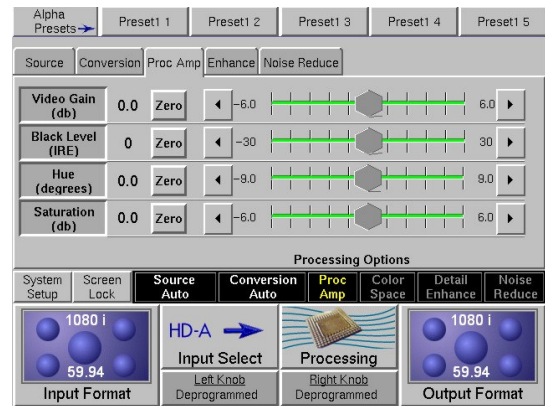
Cut Detection Aggressiveness - This control sets how large a difference must be present in a scene change before it is interpreted as a "cut." If the control were to be set too low, then simple actions such as a camera pan may be interpreted as a difference between frames and trigger the Cut Detector. Ideally, set the control at the higher end of the range so that only course changes between frames trigger the Cut Detector.

Proc Amp Control Menu

Press the Proc Amp tab to reveal the menu below:



2RU



3/6RU

Video Gain Button - Enables the Video Gain Slider.

Video Gain Slider - sets the overall amplitude of the output video signal by moving the slider to the left of center to lower the gain or to the right to increase it. An Indicator to the left of the slider shows the current value. The range of the control is +6.00dB to -6.00dB.

***Note:** Pressing the left or right arrow button at either end of any slider will also make the adjustment.*

Black Level Button - Enables the Black Level Slider.

Black Level Slider - Adjusts the black level of the output video signal by moving the slider to the left of center to lower the level or to the right to increase it. An Indicator to the left of the slider shows the current value. The range of the control is +30 IRE to -30 IRE.

Hue Button - Enables the Hue Slider.

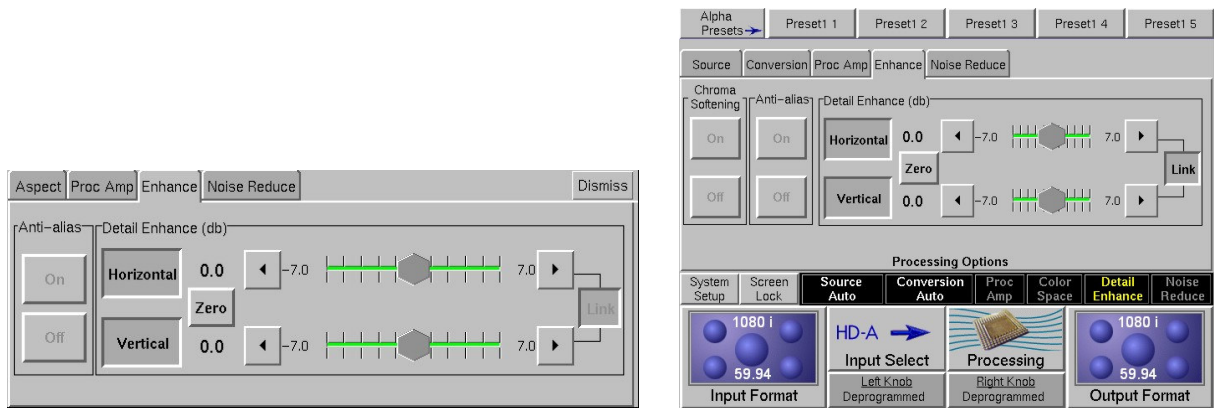
Hue Slider - Adjusts the phase of the output video signal. An Indicator to the left of the slider shows the current value. The range of the control is +9.0 degrees to -9.0 degrees.

Saturation Button - Enables the Saturation Slider.

Saturation Slider - Adjusts the Chroma Saturation of the output video signal. An indicator to the left of the slider shows the current value. The range is +6.0 to -6.0dB.

Detail Enhancement Menu

Press the Enhance tab to reveal the menu below:



2RU

3/6RU

Operation

Based on a traditional film compositing technique called "Unsharp Masking." This edge-sharpening filter allows for both positive and negative aperture correction.

User Adjustable Parameters

Horizontal Detail Slider - Allows the user to soften or sharpen the horizontal detail in the image by moving the slider to the left of center to soften the image or to the right to sharpen it. An indicator to the left of the slider shows the current value. The range of the control is +7.00dB to -7.00dB.

***Note:** Pressing the left or right arrow button at either end of the slider will make fine adjustments.*

Vertical Detail Slider - Allows the user to soften or sharpen the vertical detail in the image by moving the slider to the left of center to soften the image or to the right to sharpen it. An indicator to the left of the slider shows the current value. The range of the control is +7.00dB to -7.00dB.

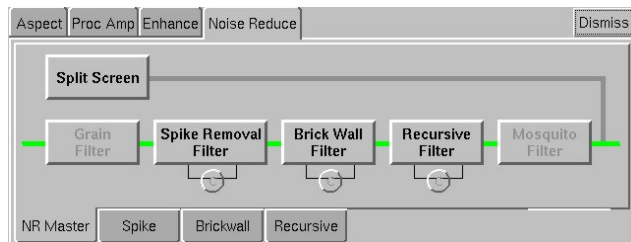
Zero Button - Permits easy reset of active sliders to "zero" value.

Link Button - Locks the operation of the Horizontal and Vertical sliders together so that changes made to one slider are reflected in proportional changes in the other slider.

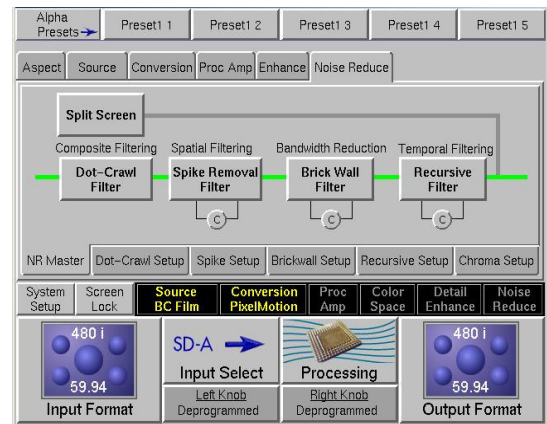
Anti Alias Filter - Not available in the imageEnhance applications.

Chroma Softening - Not available in the imageEnhance applications.

Noise Reduce - Master Menu



2RU



3/6RU

Operation

The **Master** menu displays which filters are currently engaged in the imageEnhance system and how the output signal to a monitor could be displayed.

The filter block order and the highlighted data paths on the diagram indicate the processing flow through the system. Filters that are enabled are shadowed in the display. Tabs at the bottom of the display allow the user to access the detailed parameter control menu for any of the specific filters.

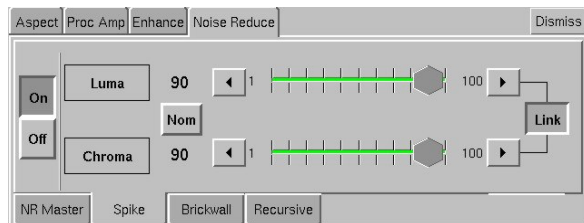
The Master menu permits the operator to enable or disable any of the noise reduction filters by selecting the corresponding button, or buttons. By selecting more than one filter, the effects of the filters may be cascaded, yielding the maximum desired level of noise reduction in one pass. By selecting a tab at the bottom of the Master menu, the operator can access and adjust the detailed controls for each filter, as described in following sections.

Note: The signal flow diagram of the NR Master menu does not show the Enhance filter. This filter is located after any of the filters shown on this menu, but is affected by the split screen function.

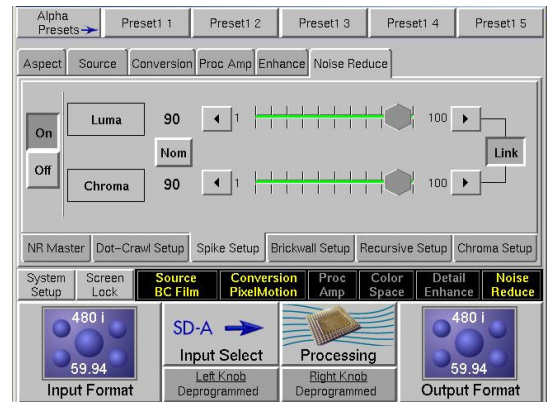
User Adjustable Parameters

- **Split Screen** - divides the image vertically. The left half of the image will be unprocessed, while the right half of the image will show the effects of the processing filters.

Adaptive Median “Spike” Filter



2RU



3/6RU

Operation

This noise reducer is an adaptive median filter that works well in removing random impulse noise. Each pixel is compared with its surrounding neighbors. A count of the number of neighbors similar to the central pixel [i.e. within threshold] is determined. Based on the number of similar neighbors, the central pixel may be labeled as random impulse noise. Any pixel labeled as noise is replaced by the median of its surrounding neighbor pixels.

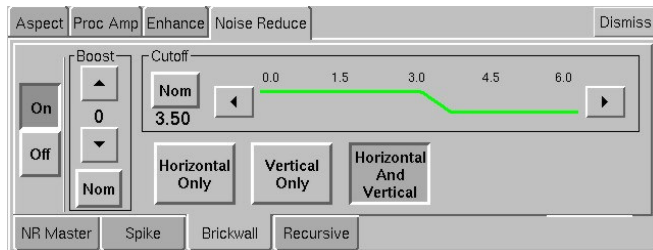
User Adjustable Parameters

Luma NR Slider - Sets the adaptive threshold of the filter in the luminance channel. This threshold represents a percentage of the central pixel value that surrounding neighbors must be within in order to be considered “similar”. An indicator to the left of the slider shows the current value. The range of the control is [1,100]. A setting of 100 forces the filter ON for every pixel, resulting in a standard median filter being applied to the entire luminance channel of the image. The nominal value for this threshold is 90. This control is currently linked to the Chroma slider.

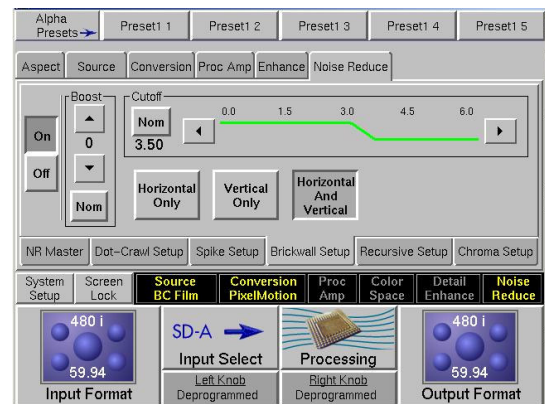
Chroma NR Slider - Sets the adaptive threshold of the filter in the Chroma channels. An indicator to the left of the slider shows the current value. The range of the control is [1,100]. A setting of 100 forces the filter ON for every pixel, resulting in a standard median filter being applied to the entire chroma channel of the image. The nominal value for this threshold is 90. This control is currently linked to the Luma slider.

Note: Pressing the left or right arrow button at either end of the sliders will make adjustments in increments of a single value.

Brickwall Filter



2RU



3/6RU

Operation

This noise reducer is a low pass filter with a sharp cutoff. A low pass filter attenuates high frequencies (i.e. image detail) while leaving low frequency information unaffected. Impulse and Gaussian noise contain high frequency components, and will be diminished when the Brickwall filter is ON. A convolution template is dynamically generated from the user inputs. The filter is applied by processing each pixel in the image with this convolution template.

This filter is primarily intended for pre-compression processing, to attenuate high frequency information that will normally be quantized away in the compression process. When the Brickwall Filter is used as a pre-compression processor, it can improve the efficiency and quality of the compression process. Removing some of the high frequency information in a controlled manner before compression has several benefits to the compressor. For example, the compressor will have more bits to spend when generating the compressed stream, since there will be less information to compress. Also, the potential for loss of desirable information due to the compressor's spending too many of its available bits on small details is decreased, resulting in a more consistent output.

User Adjustable Parameters

Cutoff (MHz) - Sets the cutoff frequency for Brickwall Filter. Information with a frequency greater than the cutoff value will be filtered, while information with a frequency less than the cutoff value will be left alone. The cutoff frequency is represented graphically by the center of the downward slope on the green line.

The numerical value of the cutoff frequency is located immediately to the right of the cutoff label. The range of the control is 0.9 to 5.5 MHz with 21 defined frequencies. The nominal value of cutoff is 3.5 MHz.

The list of defined Standard Definition frequency settings for the cutoff is shown below. The nominal value is shown in bold.

- 0.9, 1.0, 1.25, 1.50, 1.75, 2.0, 2.25, 2.5, 2.75, 3.0, 3.25, **3.5**, 3.75, 4.0, 4.25, 4.5, 4.75, 5.0, 5.25, 5.5

Note: *Pressing the left of right arrow button at either end of the graph will move the cutoff frequency to the next higher or lower defined frequency.*

Horizontal Only - the filter will only affect the picture in the horizontal axis.

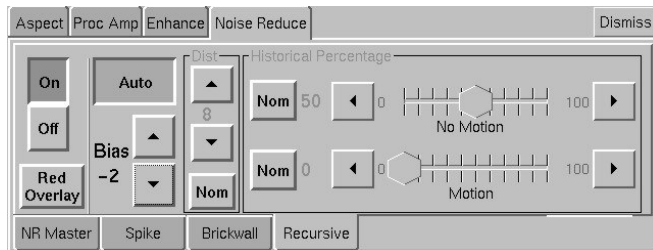
Vertical Only - the filter will only affect the picture in the vertical axis

Horizontal And Vertical - the filter will be applied to both horizontal and vertical axis. The Cutoff and Boost parameters apply to both axes.

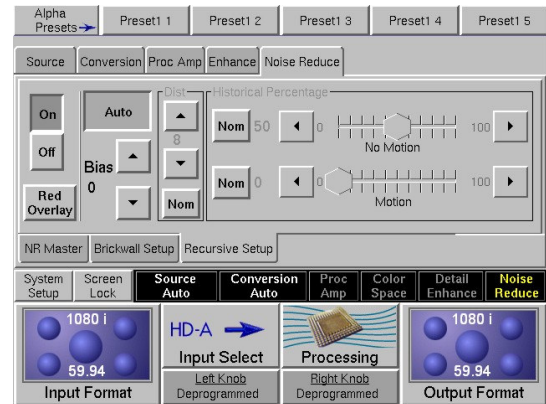
Boost - Sets the amount of boosting of amplitudes prior to the cut-off frequency for Brickwall Filter. This boosting of the amplitudes gives the appearance of sharpening in the image to help compensate for blurring that occurs when filtering out high frequency information. The range of the control is 0 to 4 dB. The nominal value for this parameter is "0".

Note: *pressing the arrow button above or below the boost value will make adjustments in increments of 1 dB.*

Temporal Recursive Filter



2RU



3/6RU

Operation

This Noise Reducer is a motion adaptive temporal recursive filter that works well in removing random and gaussian noise. Each pixel is labeled as motion, no motion, or noise. Each of these classes of pixels is treated differently in the noise reduction process. For pixels in which there is no motion, low-level Gaussian noise may be reduced via temporal processing by a weighted averaging over successive frames. For pixels labeled as random noise, spatial processing replaces these pixels. Pixels labeled as being "in motion" are retained "as is" to avoid artifacts that may be introduced through temporal processing.

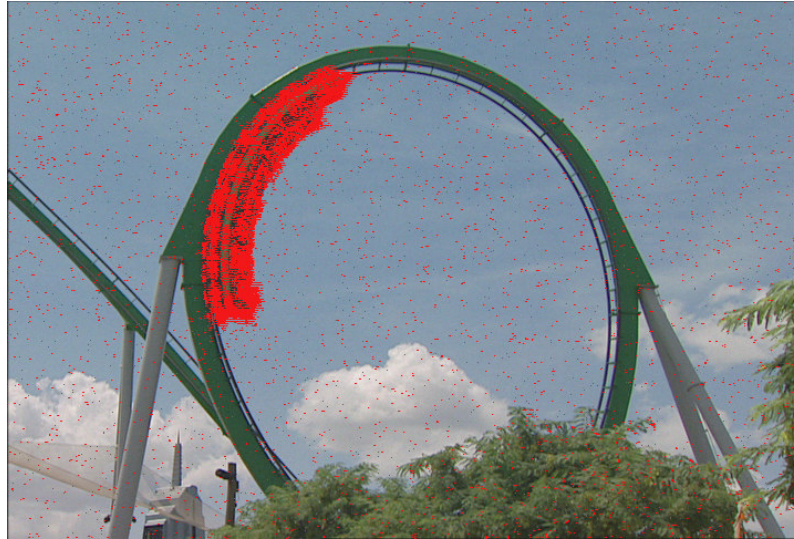
The Temporal Recursive Filter also has an "Auto" mode for providing better operation in all modes.

User Adjustable Parameters - Manual or Auto Mode

- **On/Off** - Turn this filter on or off.
- **Red Overlay Button** - When this button is selected, the system superimposes a red overlay onto areas in the input image where the temporal recursive filter will identify motion. The red overlay would display what the system is not 'attacking' or filtering.

Note: the "Red Overlay" button should not be used in combination with any other overlay button.

In the Temporal Recursive Filter, the red overlay will show the pixels in the image that have been determined to be in motion. In Auto mode, these pixels will not have any noise reduction applied to them. In manual mode they will have noise reduction applied according to the setting of the Motion, Historical Percentage slider.



In Auto mode the red overlay will help to identify the pixels in the image, which are being processed by the temporal recursive filter. In manual mode it can help in adjusting the Distance control. The Dist Button is used to set the *distance* threshold to determine the sensitivity to motion between the current frame and historical frames. This threshold represents a percentage of the current pixel value that the historical pixel value must be within in order to be considered "unchanged". The Distance control should be set to a point where only pixels that are actually in motion are colored red. This will allow noise to be correctly processed as noise rather than motion.

User Adjustable Parameters - Manual Mode (Temporal Recursive Filter)

- **Dist Button** - Sets the distance threshold to determine the sensitivity to motion between the current frame and historical frames. This threshold represents a percentage of the current pixel value that the historical pixel value must be within in order to be considered "unchanged". The **Dist** button is fully operational in this mode so the user can identify the motion sensitivity of this control, and better control it's setting. The current value is displayed in the center of the button. The range of the control is 0 to 40. The nominal value for this Dist threshold is 15.

A Dist setting of 0 will detect motion at every pixel, the impact being that no filtering will occur. A Dist setting of 40 will be less sensitive to motion, temporally filtering every pixel, which may result in blurring of any objects/areas that are in motion. In other words, if Dist is too low, it thinks everything is moving, therefore no filtering. If Dist is too high, it thinks nothing is moving, therefore filtering everything

Note: Pressing the top or bottom arrow button will make adjustments in increments of a single value.

- **Historical Percentage: No Motion NR Slider** - Sets the historical weighting factor for areas in the frame where no motion has been detected. An indicator to the left of the slider shows the current value. The range of the control is 0 to 100.

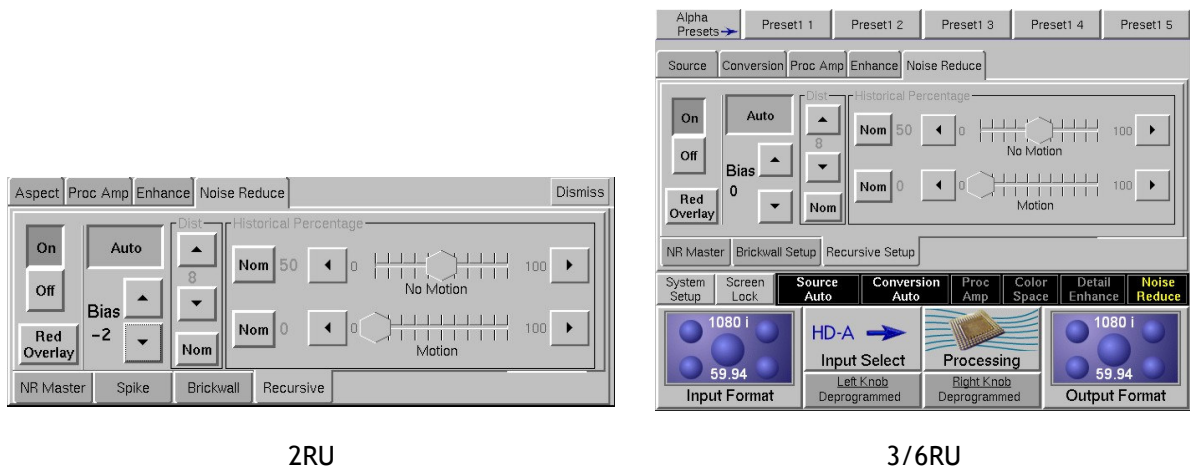
A setting of 100 forces the filter to use only historical data in areas where no motion has been detected. A setting of 0 forces the filter to use only current data in areas where no motion has been detected. The nominal setting for this slider is 75.

- **Historical Percentage: Motion NR Slider** - Sets the historical weighting factor for areas in the frame where motion has been detected. An indicator to the left of the slider shows the current value. The range of the control is 0 to 100. A setting of 100 forces the filter to use only historical data in areas where motion has been detected.

A setting of 0 forces the filter to use only current data in areas where motion has been detected. The nominal setting for this slider is 0.

Note: *Pressing the left or right arrow button at either end of these sliders will make adjustments in increments of a single value.*

User Adjustable Parameters - Automatic Mode (Temporal Recursive Filter)



- **Auto Button** - Engages a feedback controller that dynamically sets the distance, no motion and motion sliders based and noise and motion measurement extracted from the scene. Setting this button will disengage the distance, no motion and motion sliders.
- **Bias Button (Only used in Auto Mode)** - Adjusts the noise set point in the temporal recursive controller. The higher the bias, the more aggressive the controller is towards noise in the scene. The lower the bias, the more sensitive the controller is towards motion in the scene. The range of the bias control is -6 to +6, with a nominal setting of 0.

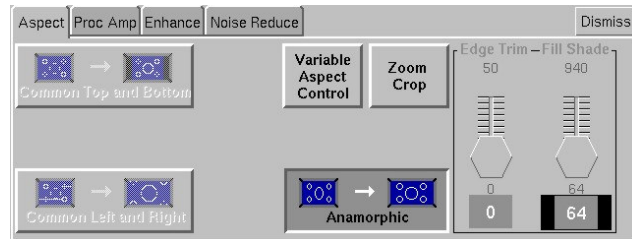
Note: Pressing the top or bottom arrow button will make adjustments in increments of a single value.

SD Noise Reduction with Grain Reduction (IE-SDNR-G)

The SD Noise Reduction with Grain Reduction application is only available in the 2RU system. This section covers the aspects of this software unique to this application. Instructions on using the Start Up Menu, overall Application layout and the System Setup menu are found in other sections of the manual dedicated to these topics.

Processing Menu

The Processing Menu is selected by pressing the **Processing** button. The Processing menu is arranged in a tab control layout in Area 2 of the touchscreen, as shown below. Each menu is selected by pressing the appropriate tab for the function desired along the top of the menu.

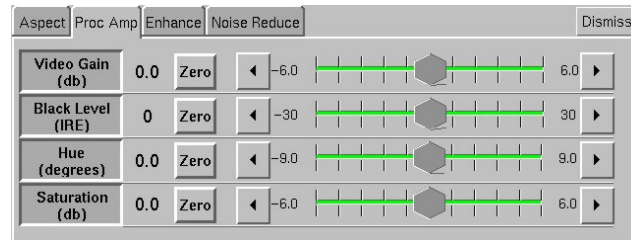


Processing - Pressing this button opens a menu in Area 2 that allows the user to access the following processing menus for the imageEnhance applications:

- Aspect Ratio Conversion
- Source Selection
- Proc Amp Control
- Detail Enhancement
- Adaptive Median Filter
- Brickwall Filter
- Temporal Recursive Filter

Proc Amp Control Menu

Press the Proc Amp tab to reveal the menu below:



Video Gain Button - Enables the Video Gain Slider.

Video Gain Slider - sets the overall amplitude of the output video signal by moving the slider to the left of center to lower the gain or to the right to increase it. An Indicator to the left of the slider shows the current value. The range of the control is +6.00dB to -6.00dB.

***Note:** Pressing the left or right arrow button at either end of any slider will also make the adjustment.*

Black Level Button - Enables the Black Level Slider.

Black Level Slider - Adjusts the black level of the output video signal by moving the slider to the left of center to lower the level or to the right to increase it. An Indicator to the left of the slider shows the current value. The range of the control is +30 IRE to -30 IRE.

Hue Button - Enables the Hue Slider.

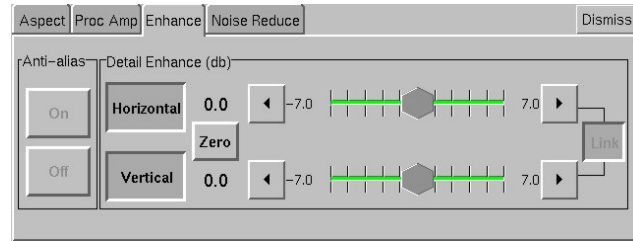
Hue Slider - Adjusts the phase of the output video signal. An Indicator to the left of the slider shows the current value. The range of the control is +9.0 degrees to -9.0 degrees.

Saturation Button - Enables the Saturation Slider.

Saturation Slider - Adjusts the Chroma Saturation of the output video signal. An indicator to the left of the slider shows the current value. The range is +6.0 to -6.0dB.

Detail Enhancement Menu

Press the Enhance tab to reveal the menu below:



Operation

Based on a traditional film compositing technique called "Unsharp Masking." This edge-sharpening filter allows for both positive and negative aperture correction.

User Adjustable Parameters

Horizontal Detail Slider - Allows the user to soften or sharpen the horizontal detail in the image by moving the slider to the left of center to soften the image or to the right to sharpen it. An indicator to the left of the slider shows the current value. The range of the control is +7.00dB to -7.00dB.

***Note:** Pressing the left or right arrow button at either end of the slider will make fine adjustments.*

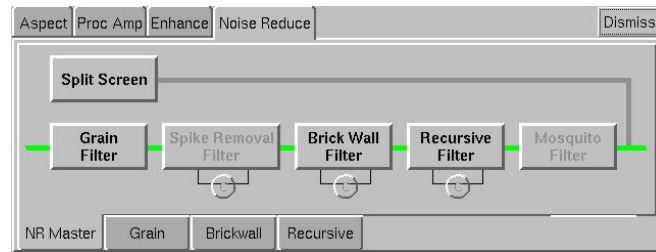
Vertical Detail Slider - Allows the user to soften or sharpen the vertical detail in the image by moving the slider to the left of center to soften the image or to the right to sharpen it. An indicator to the left of the slider shows the current value. The range of the control is +7.00dB to -7.00dB.

Zero Button - Permits easy reset of active sliders to "zero" value.

Link Button - Locks the operation of the Horizontal and Vertical sliders together so that changes made to one slider are reflected in proportional changes in the other slider.

Anti Alias Filter - Not available in the imageEnhance applications.

Noise Reduce - Master Menu



Operation

The **NR Master** menu displays which filters are currently engaged in the imageEnhance system and how the output signal to a monitor could be displayed.

The filter block order and the highlighted data paths on the diagram indicate the processing flow through the system. Filters that are enabled are shadowed in the display. Tabs at the bottom of the display allow the user to access the detailed parameter control menu for any of the specific filters.

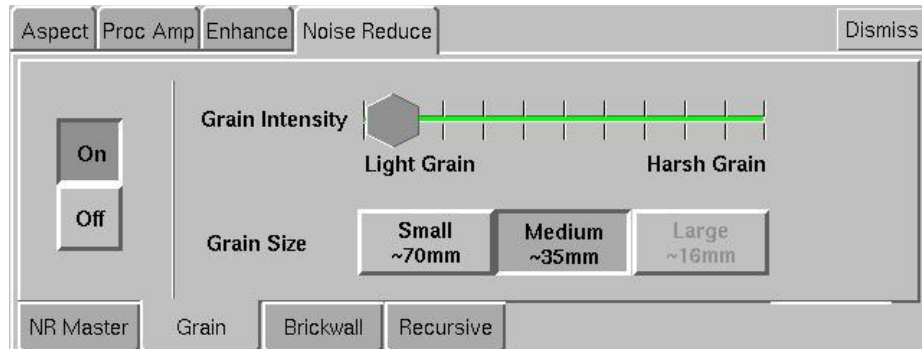
The Master menu permits the operator to enable or disable any of the noise reduction filters by selecting the corresponding button, or buttons. By selecting more than one filter, the effects of the filters may be cascaded, yielding the maximum desired level of noise reduction in one pass. By selecting a tab at the bottom of the Master menu, the operator can access and adjust the detailed controls for each filter, as described in following sections.

Note: The signal flow diagram of the NR Master menu does not show the Enhance filter. This filter is located after any of the filters shown on this menu, but is affected by the split screen function.

User Adjustable Parameters

- **Split Screen** - divides the image vertically. The left half of the image will be unprocessed, while the right half of the image will show the effects of the processing filters.

Grain Filter - 2RU



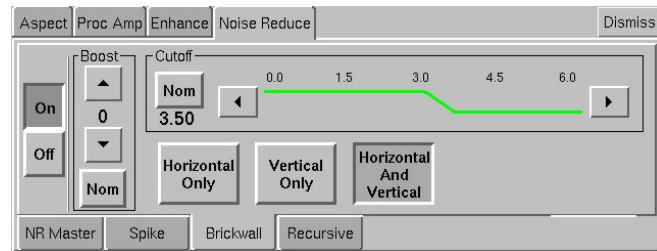
Operation

Images on motion picture film are created by grain. Film grain is distributed in random patterns on each frame of film. Under certain conditions, such as underexposure, smaller film formats, certain film stocks, and film printing, the amount of visible grain may become excessive. The grain reduction filter is a spatial filter designed to reduce the amount of excess grain in the image.

User Adjustable Parameters

- **On/Off** - Turn this filter on or off.
- **Grain Intensity Slider** - Sets the amount of grain reduction.
 - A **Light Grain** value would perform a light amount of grain reduction in the image.
 - A **Harsh Grain** (high) value would perform a harsh amount of grain reduction.Pressing **NOM** (Nominal) would return this slider to the factory setting.
- **Grain Size** - The grain size control allows the user to select the following relative grain sizes: Small (70mm), Medium (35mm) or Large (16mm). The apparent size of the grain in an image is proportional to the film frame size. In a 70mm film frame, the size of the grain will appear to be smaller than in a 16mm film frame.

Brickwall Filter



Operation

This noise reducer is a low pass filter with a sharp cutoff. A low pass filter attenuates high frequencies (i.e. image detail) while leaving low frequency information unaffected. Impulse and Gaussian noise contain high frequency components, and will be diminished when the Brickwall filter is ON. A convolution template is dynamically generated from the user inputs. The filter is applied by processing each pixel in the image with this convolution template.

This filter is primarily intended for pre-compression processing, to attenuate high frequency information that will normally be quantized away in the compression process. When the Brickwall Filter is used as a pre-compression processor, it can improve the efficiency and quality of the compression process. Removing some of the high frequency information in a controlled manner before compression has several benefits to the compressor. For example, the compressor will have more bits to spend when generating the compressed stream, since there will be less information to compress. Also, the potential for loss of desirable information due to the compressor's spending too many of its available bits on small details is decreased, resulting in a more consistent output.

User Adjustable Parameters

Cutoff (MHz) - Sets the cutoff frequency for Brickwall Filter. Information with a frequency greater than the cutoff value will be filtered, while information with a frequency less than the cutoff value will be left alone. The cutoff frequency is represented graphically by the center of the downward slope on the green line.

The numerical value of the cutoff frequency is located immediately to the right of the cutoff label. The range of the control is 0.9 to 5.5 MHz with 21 defined frequencies. The nominal value of cutoff is 3.5 MHz.

The list of defined Standard Definition frequency settings for the cutoff is shown below. The nominal value is shown in bold.

- 0.9, 1.0, 1.25, 1.50, 1.75, 2.0, 2.25, 2.5, 2.75, 3.0, 3.25, **3.5**, 3.75, 4.0, 4.25, 4.5, 4.75, 5.0, 5.25, 5.5

Note: Pressing the left of right arrow button at either end of the graph will move the cutoff frequency to the next higher or lower defined frequency.

Horizontal Only - the filter will only affect the picture in the horizontal axis.

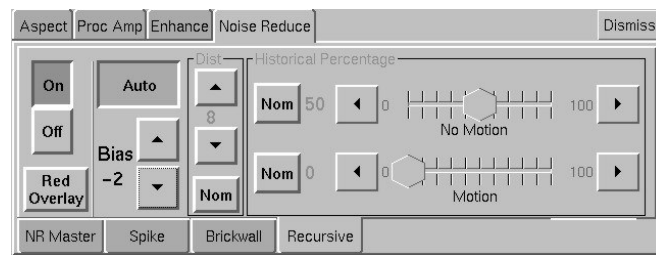
Vertical Only - the filter will only affect the picture in the vertical axis

Horizontal And Vertical - the filter will be applied to both horizontal and vertical axis. The Cutoff and Boost parameters apply to both axes.

Boost - Sets the amount of boosting of amplitudes prior to the cut-off frequency for Brickwall Filter. This boosting of the amplitudes gives the appearance of sharpening in the image to help compensate for blurring that occurs when filtering out high frequency information. The range of the control is 0 to 4 dB. The nominal value for this parameter is "0".

***Note:** pressing the arrow button above or below the boost value will make adjustments in increments of 1 dB.*

Temporal Recursive Filter



Operation

This Noise Reducer is a motion adaptive temporal recursive filter that works well in removing random and Gaussian noise. Each pixel is labeled as motion, no motion, or noise. Each of these classes of pixels is treated differently in the noise reduction process. For pixels in which there is no motion, low-level Gaussian noise may be reduced via temporal processing by a weighted averaging over successive frames. For pixels labeled as random noise, spatial processing replaces these pixels. Pixels labeled as being "in motion" are retained "as is" to avoid artifacts that may be introduced through temporal processing.

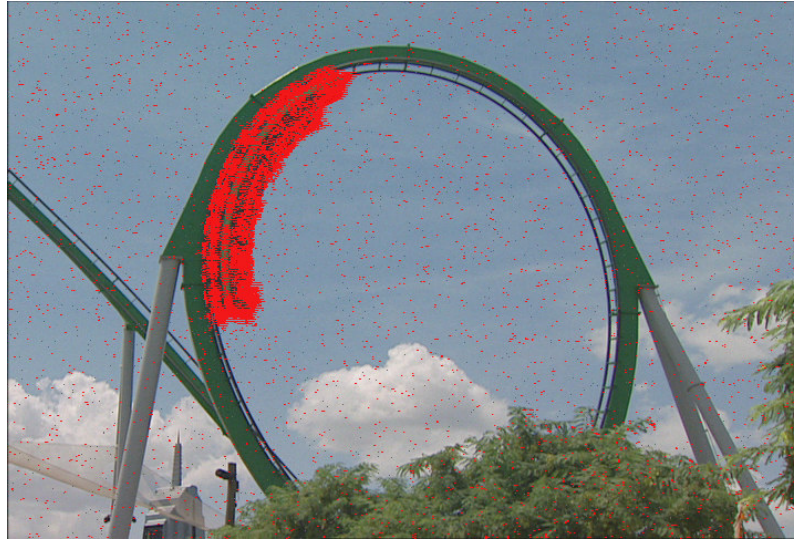
The Temporal Recursive Filter also has an "Auto" mode for providing better operation in all modes.

User Adjustable Parameters - Manual or Auto Mode

- **On/Off** - Turn this filter on or off.
- **Red Overlay Button** - When this button is selected, the system superimposes a red overlay onto areas in the input image where the temporal recursive filter will identify motion. The red overlay would display what the system is not 'attacking' or filtering.

Note: the "Red Overlay" button should not be used in combination with any other overlay button.

In the Temporal Recursive Filter, the red overlay will show the pixels in the image that have been determined to be in motion. In Auto mode, these pixels will not have any noise reduction applied to them. In manual mode they will have noise reduction applied according to the setting of the Motion, Historical Percentage slider.



In Auto mode the red overlay will help to identify the pixels in the image, which are being processed by the temporal recursive filter. In manual mode it can help in adjusting the Distance control. The Dist Button is used to set the *distance* threshold to determine the sensitivity to motion between the current frame and historical frames. This threshold represents a percentage of the current pixel value that the historical pixel value must be within in order to be considered "unchanged". The Distance control should be set to a point where only pixels that are actually in motion are colored red. This will allow noise to be correctly processed as noise rather than motion.

User Adjustable Parameters - Manual Mode (Temporal Recursive Filter)

- **Dist Button** - Sets the distance threshold to determine the sensitivity to motion between the current frame and historical frames. This threshold represents a percentage of the current pixel value that the historical pixel value must be within in order to be considered "unchanged". The **Dist** button is fully operational in this mode so the user can identify the motion sensitivity of this control, and better control it's setting. The current value is displayed in the center of the button. The range of the control is 0 to 40. The nominal value for this Dist threshold is 15.

A Dist setting of 0 will detect motion at every pixel, the impact being that no filtering will occur. A Dist setting of 40 will be less sensitive to motion, temporally filtering every pixel, which may result in blurring of any objects/areas that are in motion. In other words, if Dist is too low, it thinks everything is moving, therefore no filtering. If Dist is too high, it thinks nothing is moving, therefore filtering everything

Note: *Pressing the top or bottom arrow button will make adjustments in increments of a single value.*

- **Historical Percentage: No Motion NR Slider** - Sets the historical weighting factor for areas in the frame where no motion has been detected. An indicator to the left of the slider shows the current value. The range of the control is 0 to 100.

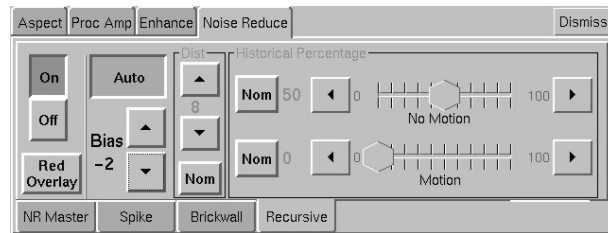
A setting of 100 forces the filter to use only historical data in areas where no motion has been detected. A setting of 0 forces the filter to use only current data in areas where no motion has been detected. The nominal setting for this slider is 75.

- **Historical Percentage: Motion NR Slider** - Sets the historical weighting factor for areas in the frame where motion has been detected. An indicator to the left of the slider shows the current value. The range of the control is 0 to 100. A setting of 100 forces the filter to use only historical data in areas where motion has been detected.

A setting of 0 forces the filter to use only current data in areas where motion has been detected. The nominal setting for this slider is 0.

Note: *Pressing the left or right arrow button at either end of these sliders will make adjustments in increments of a single value.*

User Adjustable Parameters - Automatic Mode (Temporal Recursive Filter)



- **Auto Button** - Engages a feedback controller that dynamically sets the distance, no motion and motion sliders based on noise and motion measurement extracted from the scene. Setting this button will disengage the distance, no motion and motion sliders.
- **Bias Button (Only used in Auto Mode)** - Adjusts the noise set point in the temporal recursive controller. The higher the bias, the more aggressive the controller is towards noise in the scene. The lower the bias, the more sensitive the controller is towards motion in the scene. The range of the bias control is -6 to +6, with a nominal setting of 0.

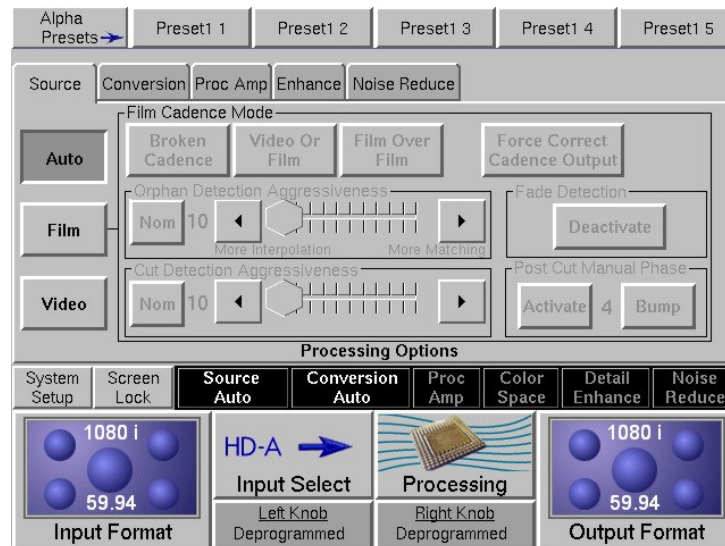
Note: Pressing the top or bottom arrow button will make adjustments in increments of a single value.

HD Noise Reduction (IE-HDNR)

The HD Noise Reduction application is only available in the 6RU system. This section covers the aspects of this software unique to this application. Instructions on using the Start Up Menu, overall Application layout and the System Setup menu are found in other sections of the manual dedicated to these topics.

Processing Menu - 6RU

The Processing Menu is selected by pressing the **Processing** button. The Processing menu is arranged in a tab control layout in Area 2 of the touchscreen, as shown below. Each menu is selected by pressing the appropriate tab for the function desired along the top of the menu.

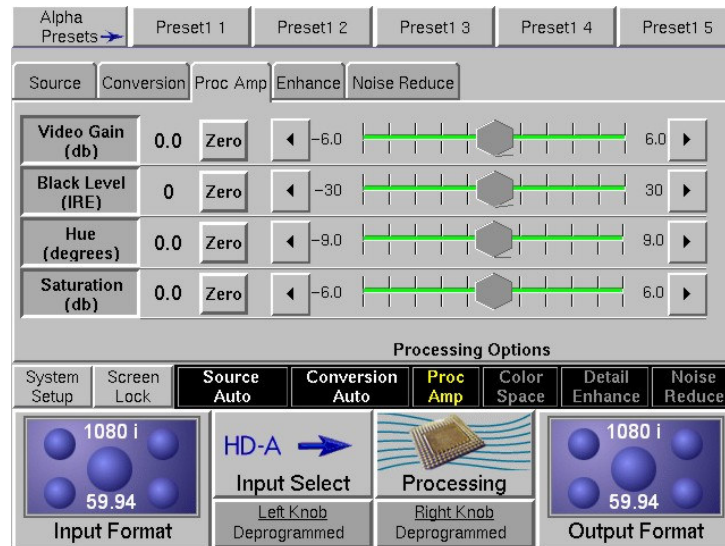


Processing - Pressing this button opens a menu in Area 2 that allows the user to access the following processing menus for the imageEnhance applications:

- Source Selection
- Proc Amp Control
- Detail Enhancement
- Brickwall Filter
- Temporal Recursive Filter

Proc Amp Control Menu - 6RU

Press the Proc Amp tab to reveal the menu below:



Video Gain Button - Enables the Video Gain Slider.

Video Gain Slider - sets the overall amplitude of the output video signal by moving the slider to the left of center to lower the gain or to the right to increase it. An Indicator to the left of the slider shows the current value. The range of the control is +6.00dB to -6.00dB.

***Note:** Pressing the left or right arrow button at either end of any slider will also make the adjustment.*

Black Level Button - Enables the Black Level Slider.

Black Level Slider - Adjusts the black level of the output video signal by moving the slider to the left of center to lower the level or to the right to increase it. An Indicator to the left of the slider shows the current value. The range of the control is +30 IRE to -30 IRE.

Hue Button - Enables the Hue Slider.

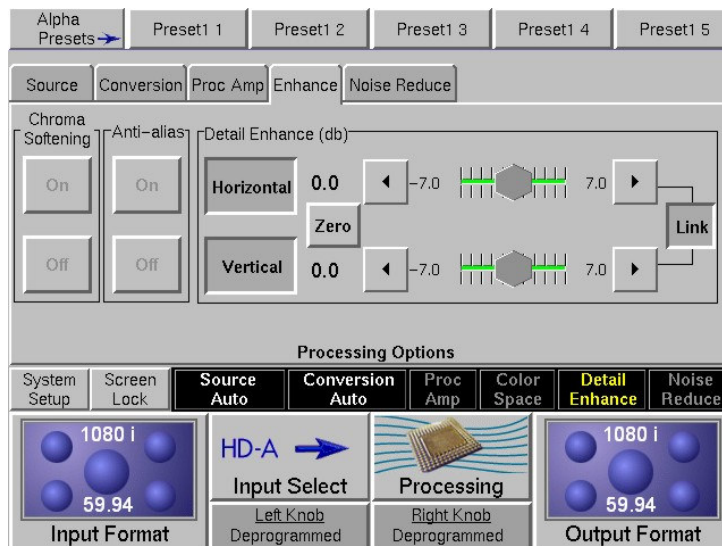
Hue Slider - Adjusts the phase of the output video signal. An Indicator to the left of the slider shows the current value. The range of the control is +9.0 degrees to -9.0 degrees.

Saturation Button - Enables the Saturation Slider.

Saturation Slider - Adjusts the Chroma Saturation of the output video signal. An indicator to the left of the slider shows the current value. The range is +6.0 to -6.0dB.

Detail Enhance Menu - 6RU

Press the Enhance tab to reveal the menu below:



Operation

Based on a traditional film compositing technique called "Unsharp Masking." This edge-sharpening filter allows for both positive and negative aperture correction.

User Adjustable Parameters

Horizontal Detail Slider - Allows the user to soften or sharpen the horizontal detail in the image by moving the slider to the left of center to soften the image or to the right to sharpen it. An indicator to the left of the slider shows the current value. The range of the control is +7.00dB to -7.00dB.

***Note:** Pressing the left or right arrow button at either end of the slider will make fine adjustments.*

Vertical Detail Slider - Allows the user to soften or sharpen the vertical detail in the image by moving the slider to the left of center to soften the image or to the right to sharpen it. An indicator to the left of the slider shows the current value. The range of the control is +7.00dB to -7.00dB.

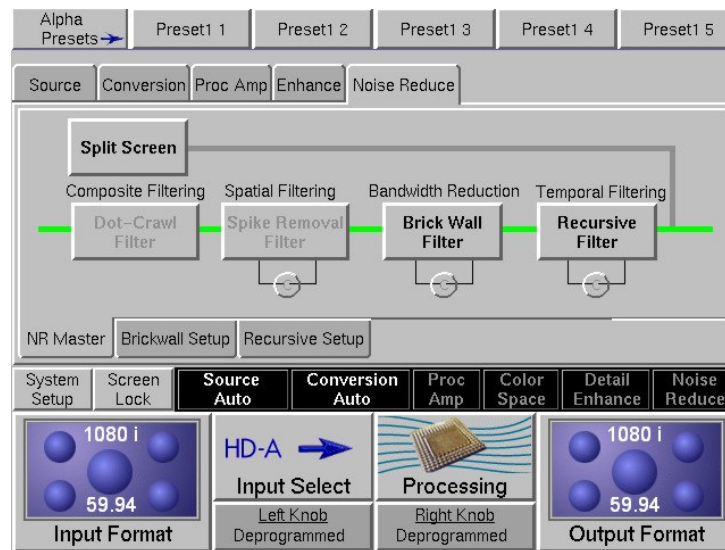
Zero Button - Permits easy reset of active sliders to "zero" value.

Link Button - Locks the operation of the Horizontal and Vertical sliders together so that changes made to one slider are reflected in proportional changes in the other slider.

Anti Alias Filter - Not available in the imageEnhance applications.

Chroma Softening - Not available in the imageEnhance applications.

Noise Reduce - Master Menu - 6RU



Operation

The **Master** menu displays which filters are currently engaged in the imageEnhance system and how the output signal to a monitor could be displayed.

The filter block order and the highlighted data paths on the diagram indicate the processing flow through the system. Filters that are enabled are shadowed in the display. Tabs at the bottom of the display allow the user to access the detailed parameter control menu for any of the specific filters.

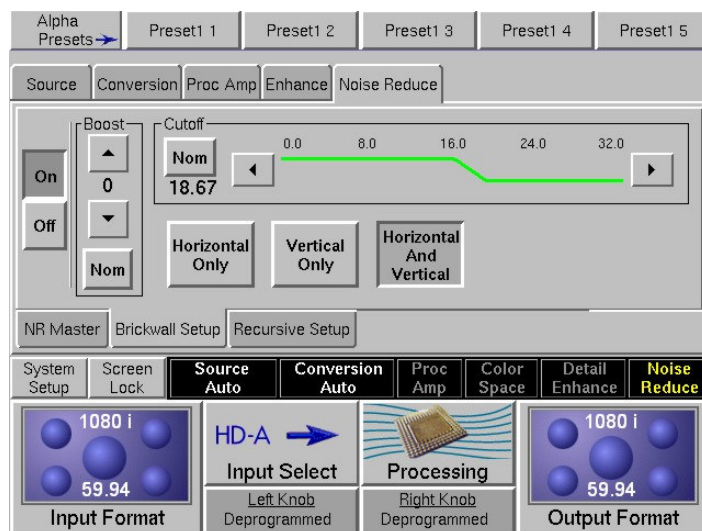
The Master menu permits the operator to enable or disable any of the noise reduction filters by selecting the corresponding button, or buttons. By selecting more than one filter, the effects of the filters may be cascaded, yielding the maximum desired level of noise reduction in one pass. By selecting a tab at the bottom of the Master menu, the operator can access and adjust the detailed controls for each filter, as described in following sections.

Note: The signal flow diagram of the NR Master menu does not show the Enhance filter. This filter is located after any of the filters shown on this menu, but is affected by the split screen function.

User Adjustable Parameters

- **Split Screen** - divides the image vertically. The left half of the image will be unprocessed, while the right half of the image will show the effects of the processing filters.

Brickwall Filter - 6RU



Operation

This noise reducer is a low pass filter with a sharp cutoff. A low pass filter attenuates high frequencies (i.e. image detail) while leaving low frequency information unaffected. Impulse and Gaussian noise contain high frequency components, and will be diminished when the Brickwall filter is ON. A convolution template is dynamically generated from the user inputs. The filter is applied by processing each pixel in the image with this convolution template.

This filter is primarily intended for pre-compression processing, to attenuate high frequency information that will normally be quantized away in the compression process. When the Brickwall Filter is used as a pre-compression processor, it can improve the efficiency and quality of the compression process. Removing some of the high frequency information in a controlled manner before compression has several benefits to the compressor. For example, the compressor will have more bits to spend when generating the compressed stream, since there will be less information to compress. Also, the potential for loss of desirable information due to the compressor's spending too many of its available bits on small details is decreased, resulting in a more consistent output.

User Adjustable Parameters

Cutoff (MHz) - Sets the cutoff frequency for Brickwall Filter. Information with a frequency greater than the cutoff value will be filtered, while information with a frequency less than the cutoff value will be left alone. The cutoff frequency is represented graphically by the center of the downward slope on the green line.

The numerical value of the cutoff frequency is located immediately to the right of the cutoff label. The range of the control in Standard Definition is 0.9 to 5.5 MHz with 21 defined frequencies. The nominal value of cutoff is 3.5 MHz. In High Definition, the range of this control is 4.8 to 29.33 MHz with 21 defined frequencies. For High Definition the nominal value of cutoff is 18.67 MHz.

The list of defined Standard Definition frequency settings for the cutoff is shown below. The nominal value is shown in bold.

- 0.9, 1.0, 1.25, 1.50, 1.75, 2.0, 2.25, 2.5, 2.75, 3.0, 3.25, **3.5**, 3.75, 4.0, 4.25, 4.5, 4.75, 5.0, 5.25, 5.5

The list of defined Standard Definition frequency settings for the cutoff is shown below. The nominal value is shown in bold.

- 4.8, 5.33, 6.67, 8.00, 9.33, 10.67, 12.0, 12.8, 13.33, 14.67, 16.0, 17.33, **18.67**, 20.0, 21.33, 22.67, 24.0, 25.33, 26.67, 28.0, 29.33

***Note:** Pressing the left of right arrow button at either end of the graph will move the cutoff frequency to the next higher or lower defined frequency.*

Horizontal Only - the filter will only affect the picture in the horizontal axis.

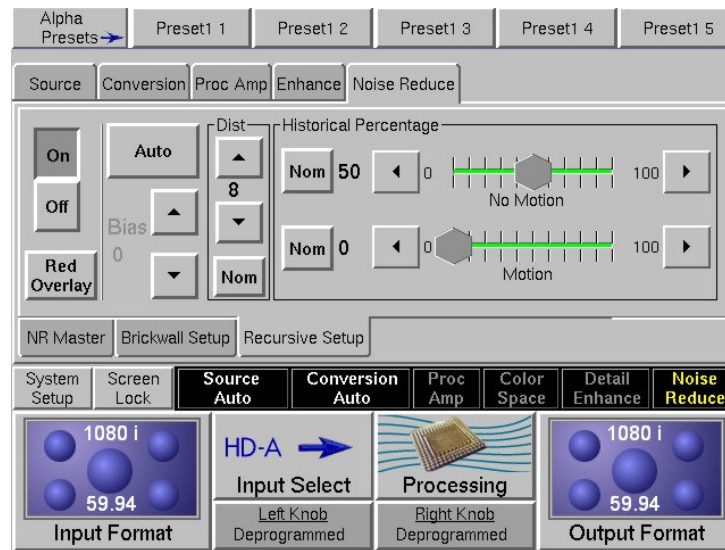
Vertical Only - the filter will only affect the picture in the vertical axis

Horizontal And Vertical - the filter will be applied to both horizontal and vertical axis. The Cutoff and Boost parameters apply to both axes.

Boost - Sets the amount of boosting of amplitudes prior to the cut-off frequency for Brickwall Filter. This boosting of the amplitudes gives the appearance of sharpening in the image to help compensate for blurring that occurs when filtering out high frequency information. The range of the control is 0 to 4 dB. The nominal value for this parameter is "0".

***Note:** pressing the arrow button above or below the boost value will make adjustments in increments of 1 dB.*

Temporal Recursive Filter - 3RU & 6RU



Operation

This Noise Reducer is a motion adaptive temporal recursive filter that works well in removing random and Gaussian noise. Each pixel is labeled as motion, no motion, or noise. Each of these classes of pixels is treated differently in the noise reduction process. For pixels in which there is no motion, low-level Gaussian noise may be reduced via temporal processing by a weighted averaging over successive frames. For pixels labeled as random noise, spatial processing replaces these pixels. Pixels labeled as being “in motion” are retained “as is” to avoid artifacts that may be introduced through temporal processing.

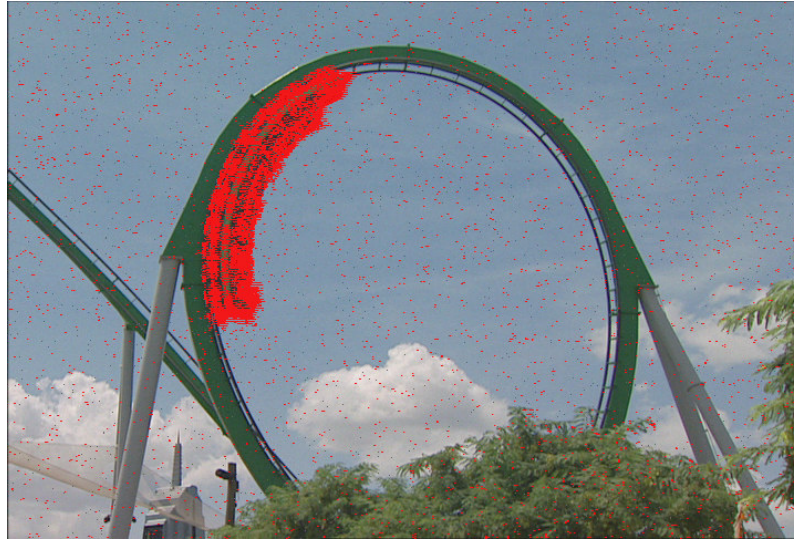
The Temporal Recursive Filter also has an “Auto” mode for providing better operation in all modes.

User Adjustable Parameters - Manual or Auto Mode

- **On/Off** - Turn this filter on or off.
- **Red Overlay Button** - When this button is selected, the system superimposes a red overlay onto areas in the input image where the temporal recursive filter will identify motion. The red overlay would display what the system is not ‘attacking’ or filtering.

Note: the “Red Overlay” button should not be used in combination with any other overlay button.

In the Temporal Recursive Filter, the red overlay will show the pixels in the image that have been determined to be in motion. In Auto mode, these pixels will not have any noise reduction applied to them. In manual mode they will have noise reduction applied according to the setting of the Motion, Historical Percentage slider.



In Auto mode the red overlay will help to identify the pixels in the image, which are being processed by the temporal recursive filter. In manual mode it can help in adjusting the Distance control. The Dist Button is used to set the *distance* threshold to determine the sensitivity to motion between the current frame and historical frames. This threshold represents a percentage of the current pixel value that the historical pixel value must be within in order to be considered "unchanged". The Distance control should be set to a point where only pixels that are actually in motion are colored red. This will allow noise to be correctly processed as noise rather than motion.

User Adjustable Parameters - Manual Mode (Temporal Recursive Filter)

- **Dist Button** - Sets the distance threshold to determine the sensitivity to motion between the current frame and historical frames. This threshold represents a percentage of the current pixel value that the historical pixel value must be within in order to be considered "unchanged". The **Dist** button is fully operational in this mode so the user can identify the motion sensitivity of this control, and better control it's setting. The current value is displayed in the center of the button. The range of the control is 0 to 40. The nominal value for this Dist threshold is 15.

A Dist setting of 0 will detect motion at every pixel, the impact being that no filtering will occur. A Dist setting of 40 will be less sensitive to motion, temporally filtering every pixel, which may result in blurring of any objects/areas that are in motion. In other words, if Dist is too low, it thinks everything is moving, therefore no filtering. If Dist is too high, it thinks nothing is moving, therefore filtering everything

Note: Pressing the top or bottom arrow button will make adjustments in increments of a single value.

- **Historical Percentage: No Motion NR Slider** - Sets the historical weighting factor for areas in the frame where no motion has been detected. An indicator to the left of the slider shows the current value. The range of the control is 0 to 100.

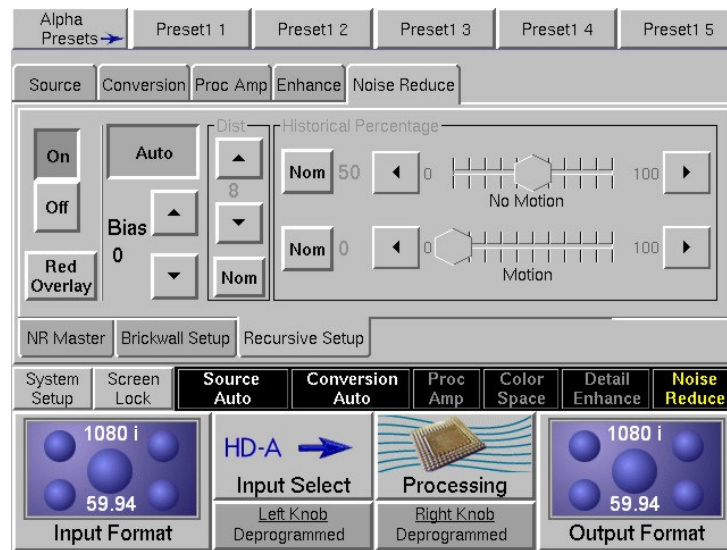
A setting of 100 forces the filter to use only historical data in areas where no motion has been detected. A setting of 0 forces the filter to use only current data in areas where no motion has been detected. The nominal setting for this slider is 75.

- **Historical Percentage: Motion NR Slider** - Sets the historical weighting factor for areas in the frame where motion has been detected. An indicator to the left of the slider shows the current value. The range of the control is 0 to 100. A setting of 100 forces the filter to use only historical data in areas where motion has been detected.

A setting of 0 forces the filter to use only current data in areas where motion has been detected. The nominal setting for this slider is 0.

Note: *Pressing the left or right arrow button at either end of these sliders will make adjustments in increments of a single value.*

User Adjustable Parameters - Automatic Mode (Temporal Recursive Filter)



- **Auto Button** - Engages a feedback controller that dynamically sets the distance, no motion and motion sliders based and noise and motion measurement extracted from the scene. Setting this button will disengage the distance, no motion and motion sliders.
- **Bias Button (Only used in Auto Mode)** - Adjusts the noise set point in the temporal recursive controller. The higher the bias, the more aggressive the controller is towards noise in the scene. The lower the bias, the more sensitive the controller is towards motion in the scene. The range of the bias control is -6 to +6, with a nominal setting of 0.

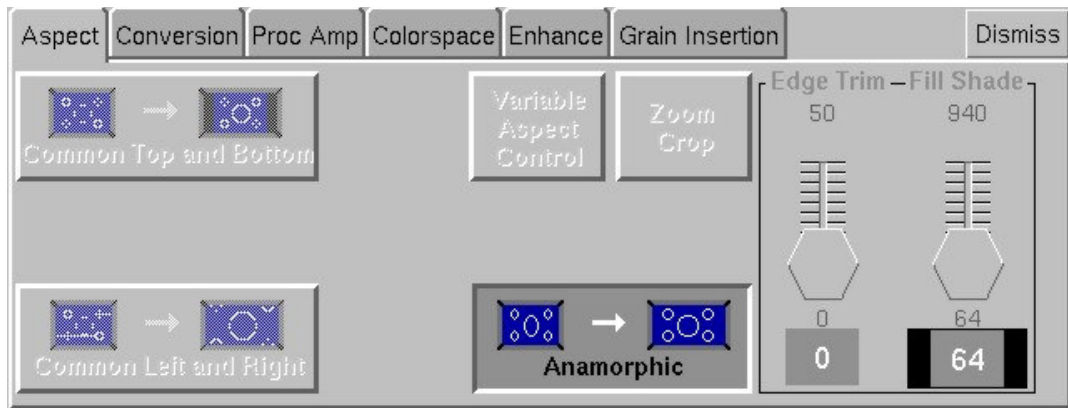
Note: Pressing the top or bottom arrow button will make adjustments in increments of a single value.

Cine Maker (IE-SDFL)

The Cine Maker application is only available in the 2RU system. This section covers the aspects of this software unique to this application. Instructions on using the Start Up Menu, overall Application layout and the System Setup menu are found in other sections of the manual dedicated to these topics.

Processing Menu

The Processing Menu is selected by pressing the **Processing** button. The Processing menu is arranged in a tab control layout in Area 2 of the touchscreen, as shown below. Each menu is selected by pressing the appropriate tab for the function desired along the top of the menu.

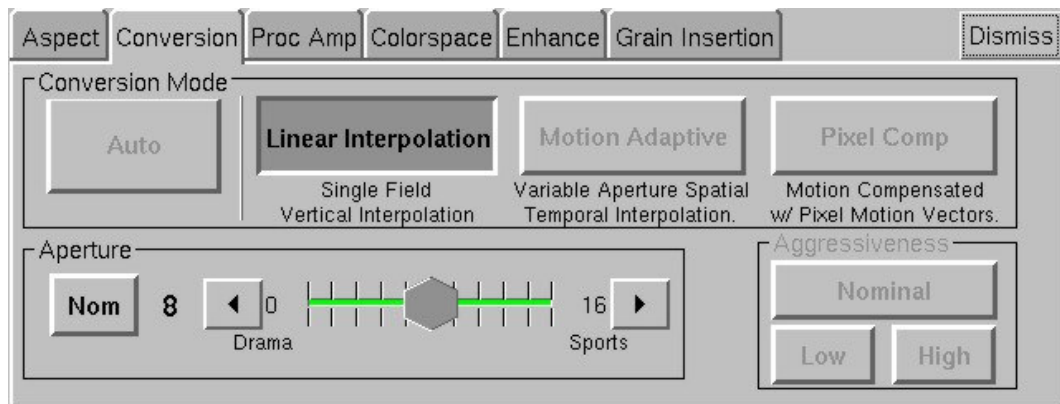


Processing - Pressing this button opens a menu in Area 2 that allows the user to access the following processing menus for the imageEnhance applications:

- Conversion
- Proc Amp
- Colorspace
- Detail Enhancement
- Grain Insertion

Conversion Menu

The Conversion Mode menu allows the user to select the appropriate method used for processing the input image.



Operation

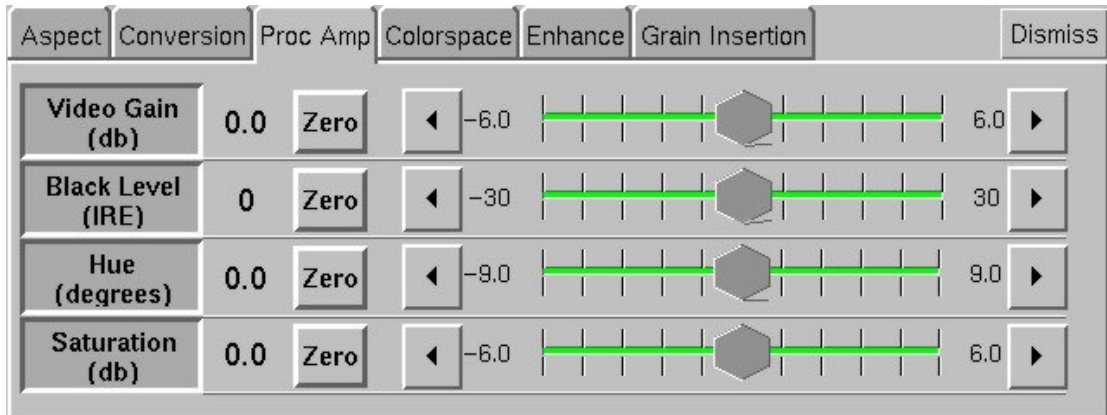
The Cine Maker application by definition is adding a film cadence to incoming video. Because of this the only conversion option available is Linear Interpolation. Use the Interpolation Aperture adjustment to reach a setting that maximizes sharpness, but minimizes motion judder.

User Adjustable Parameters

- **Auto** - Not available in the Cine Maker application.
- **Linear Interpolation** - De-interlaces the input image by throwing away one field of information from each frame and then re-samples the missing lines to match the output format. This method is simple to implement but results in a loss of vertical detail.
- **PixelMotion™** - Not available in the Cine Maker application.
- **PixelComp™** - Not available in the Cine Maker application.
- **Interpolation Aperture** - Adjusts the temporal interpolation aperture used in the linear conversion mode. Move the slider to the left, which flattens the aperture to maximize sharpness and to the right, which sharpens the aperture to minimize motion, judder. The range of this control is 0 to 16, with a nominal value of 8. Lower settings are better for slow moving images such as dramas, while the higher settings are more appropriate for fast motion content such as sports.
- **PixelComp™ Aggressiveness** - Not available in the Cine Maker application.

Proc Amp Control Menu

Press the Proc Amp tab to reveal the menu below:



Video Gain Button - Enables the Video Gain Slider.

Video Gain Slider - sets the overall amplitude of the output video signal by moving the slider to the left of center to lower the gain or to the right to increase it. An Indicator to the left of the slider shows the current value. The range of the control is +6.00dB to -6.00dB.

***Note:** Pressing the left or right arrow button at either end of any slider will also make the adjustment.*

Black Level Button - Enables the Black Level Slider.

Black Level Slider - Adjusts the black level of the output video signal by moving the slider to the left of center to lower the level or to the right to increase it. An Indicator to the left of the slider shows the current value. The range of the control is +30 IRE to -30 IRE.

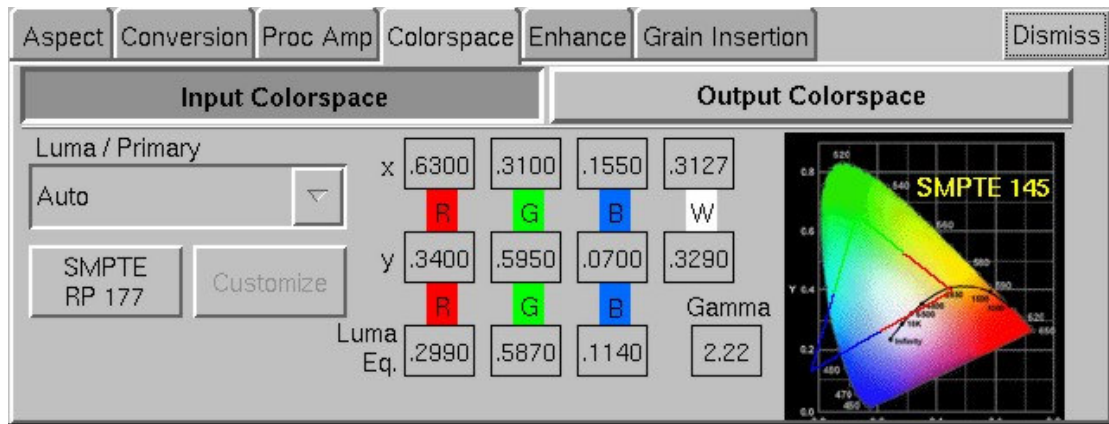
Hue Button - Enables the Hue Slider.

Hue Slider - Adjusts the phase of the output video signal. An Indicator to the left of the slider shows the current value. The range of the control is +9.0 degrees to -9.0 degrees.

Saturation Button - Enables the Saturation Slider.

Saturation Slider - Adjusts the Chroma Saturation of the output video signal. An indicator to the left of the slider shows the current value. The range is +6.0 to -6.0dB.

Colorspace Menu



The colorspace menu allows the user to select the input signal color space as well as the output signal colorspace from a pull down list.

In the center of the colorspace menu is an area that shows the CIE X, & Y coordinates of the R, G and B primaries for the selected colorspace. It also displays the luma equation and gamma.

To the right of these numbers is a graphical representation of the CIE color spectrum. The spectrum will always show the currently selected output colorspace triangle within the display.

A drop-down menu provides access to a set of pre-programmed colorspace settings. The most commonly used setting is "Auto" mode, which automatically establishes the input and/or output colorspace based on the input and output formats selected by the user.

SMPTE RP177 - Determines whether the output colorspace uses the SMPTE RP177 parameters in addition to the parameters chosen by the pull-down menu.

Customize - Opens the Custom Colorspace Menu. See the following section for details on this menu.

SPECIAL SETTINGS:

D-Cinema 1 - represents an approximate setting for DLP video projectors.

D-Cinema 2 - represents an approximate setting for DILA video projectors.

Custom Colorspace - allows the user to define they're own colorspace coordinates.

Custom Colorspace Menu

Enter New CIE, Luma and Gamma Values

	x	y
Primaries	R .6300	.3400
	G .3100	.5950
	B .1550	.0700
	W .3127	.3290
Luma Equation	.2990	.5870
	.1140 (comp)	

CANCEL

0. 6 3 0 0

7 8 9

4 5 6 0

1 2 3

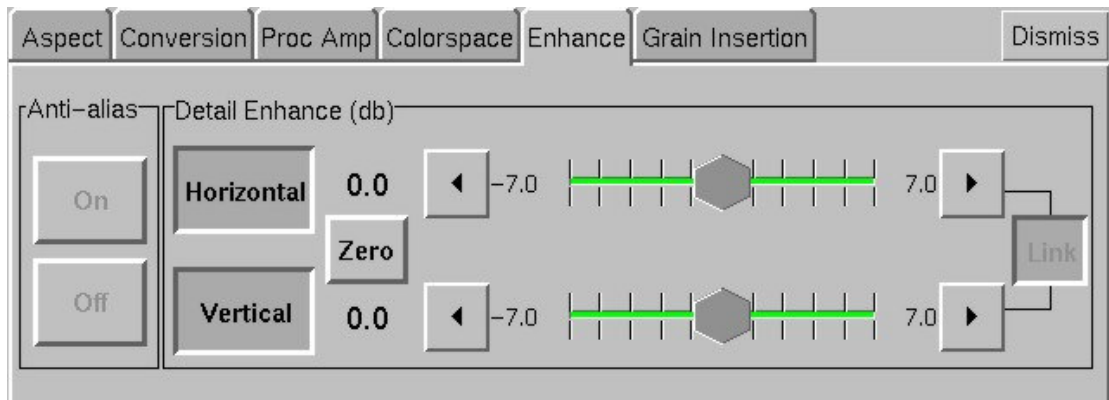
OK

The Custom Colorspace mode allows users to enter their own colorspace parameters directly into the unit by entering custom CIE X & Y coordinates for the primaries, as well as equations for luminance.

To enter new parameters, first select the box corresponding to the parameter to be changed, then enter the numeric value for the parameter using the 10-key numeric pad on the GUI. Repeat until all parameters have been entered. When finished, press *OK* to accept the parameters, or *CANCEL* to abort the process.

Detail Enhancement Menu

Press the Enhance tab to reveal the menu below:



Operation

Based on a traditional film compositing technique called "Unsharp Masking." This edge-sharpening filter allows for both positive and negative aperture correction.

User Adjustable Parameters

Horizontal Detail Slider - Allows the user to soften or sharpen the horizontal detail in the image by moving the slider to the left of center to soften the image or to the right to sharpen it. An indicator to the left of the slider shows the current value. The range of the control is +7.00dB to -7.00dB.

***Note:** Pressing the left or right arrow button at either end of the slider will make fine adjustments.*

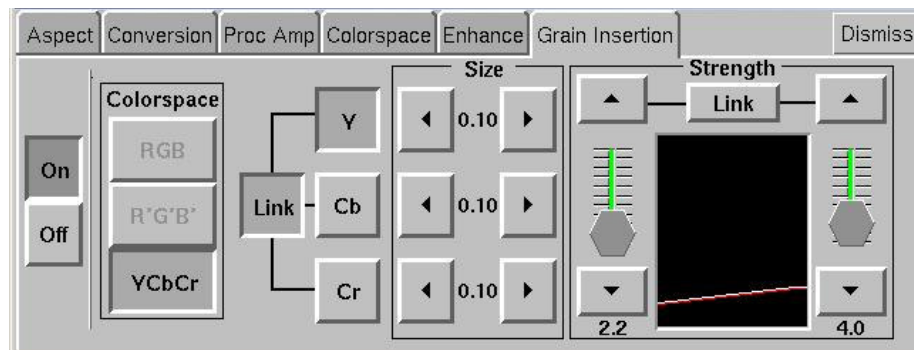
Vertical Detail Slider - Allows the user to soften or sharpen the vertical detail in the image by moving the slider to the left of center to soften the image or to the right to sharpen it. An indicator to the left of the slider shows the current value. The range of the control is +7.00dB to -7.00dB.

Zero Button - Permits easy reset of active sliders to "zero" value.

Link Button - Locks the operation of the Horizontal and Vertical sliders together so that changes made to one slider are reflected in proportional changes in the other slider.

Anti Alias Filter - Not available in the imageEnhance applications.

Grain Insertion Menu



Operation

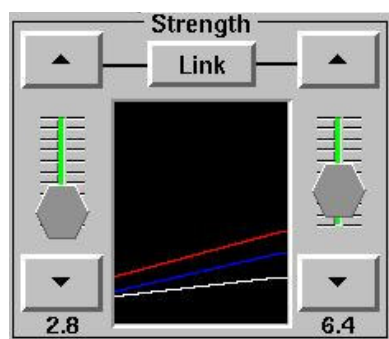
There are several parameters that allow for a very flexible configuration for adding grain to the incoming video. The first choice to be made is what colorspace to operate in. Currently the only choice is YCbCr.

The second choice is whether to apply the grain to all of the channels equally or tailor the grain to each color channel.

For each channel (or all of them if the Link function is used) the size of grain and the amount of grain in low intensity and high intensity areas can be altered.

The graph in the Strength area of the menu shows the relative strength of grain added to the low intensity (darker) areas of the video controlled by the slider on the left, and grain added to the high intensity (lighter) areas of the video controlled by the slider on the right.

Each of the color channels is represented in this graph as a line of a different color. In the case of YCbCr, the Y channel is represented by a white line, the Cb channel by the blue line, and the Cr channel by a red line. This situation is shown in the illustration below. If the channels are linked together, the lines will move together as shown in the illustration at the top of this section.



Grain Strength Display

While the range of grain strength can be from 0.1 to 20 on the sliders, best results are typically found in the range of 1 to 5. The grain size range is from 0.0 to 3.0, but best results are typically found in the range of 0.1 to 1.0. The settings shown on the illustration at the top of this section show a reasonable starting point for grain insertion.

User Adjustable Parameters

On/Off - Enables or disables the grain insertion

Colorspace - Determines where in the signal processing path the grain is inserted.

RGB - Inserts the grain in the RGB channels (**Not available in this version**)

R'B'G' - inserts the grain in the RGB primaries (**Not available in this version**)

YCbCr - Inserts the grain in the color difference signal.

Color Channel Buttons

R - Applies the grain insertion to the R channel

G - Applies the grain insertion to the G channel

B - Applies the grain insertion to the B channel

***Note:** These controls will be relabeled depending on the colorspace selection*

Link - Applies the grain insertion to all three color channels

Size - Determines the size of the grain that will be inserted. The size can be set independently for each channel. The range of grain size is 0.0 to 3.0.

Strength - Adjusts the intensity of the grain inserted in the image.

Left-hand slider - controls the level of grain inserted in low intensity portions of the image.

Right-hand slider - controls the level of grain inserted in high intensity areas of the image.

Grain Strength Graph - The display shows the relative values of grain insertion for each color channel. A line on the display represents each channel. The Y channel is white, Cb channel is blue and Cr channel is red.

These controls can be applied independently to each channel. The range of these two sliders is from 0.1 to 20.

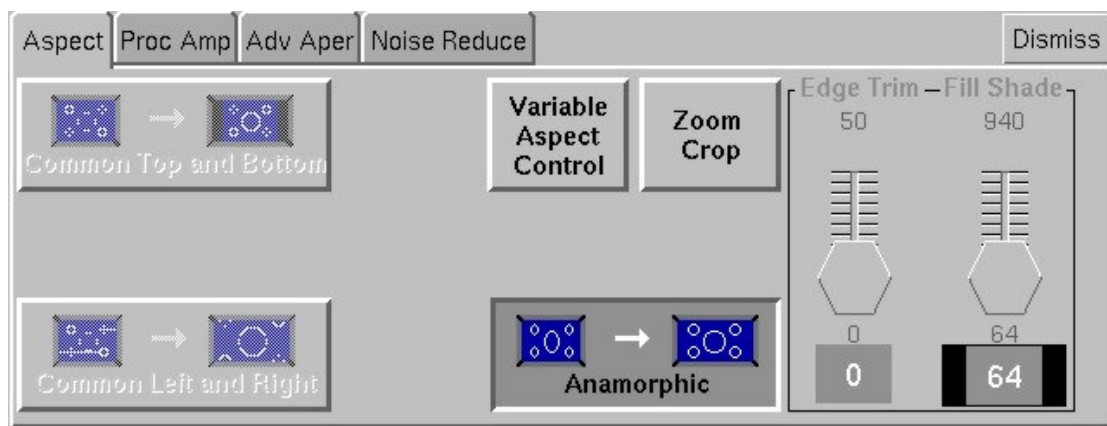
Link - Ties the two strength sliders together

MPEG Artifact Removal (IE-MPEG-AR)

The MPEG-AR application is only available in the 2RU system. This section covers the aspects of this software unique to the MPEG-AR application. Instructions on using the Start Up Menu, overall Application layout and the System Setup menu are found in previous sections of the manual dedicated to these topics.

Processing Menu

The Processing Menu is selected by pressing the **Processing** button. The Processing menu is arranged in a tab control layout in Area 2 of the touchscreen, as shown below. Each menu is selected by pressing the appropriate tab for the function desired along the top of the menu.



Processing - Pressing this button opens a menu in Area 2 that allows the user to access the following processing menus for the imageEnhance applications:

- Aspect Ratio Conversion

- Proc Amp Control

- Advanced Aperture Correction

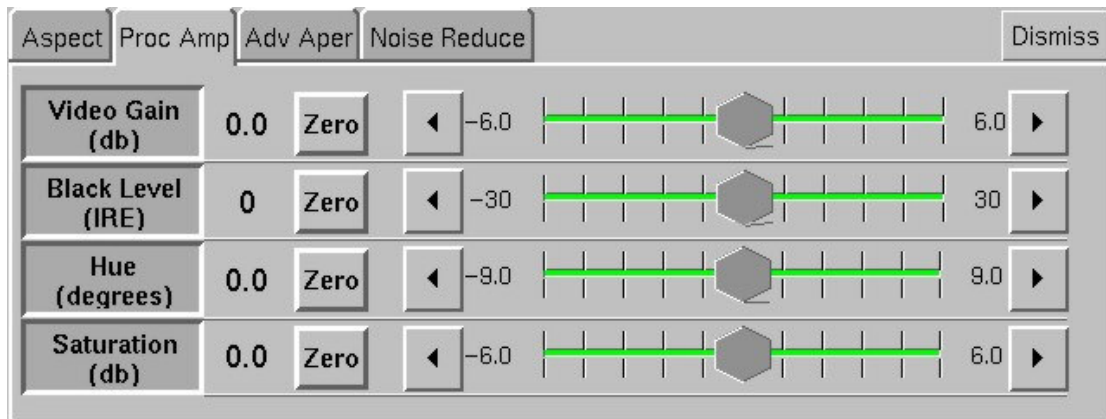
- MPEG Artifact Removal

- Brickwall Filter

- Temporal Recursive Filter

Proc Amp Control Menu

Press the Proc Amp tab to reveal the menu below:



Video Gain Button - Enables the Video Gain Slider.

Video Gain Slider - sets the overall amplitude of the output video signal by moving the slider to the left of center to lower the gain or to the right to increase it. An Indicator to the left of the slider shows the current value. The range of the control is +6.00dB to -6.00dB.

***Note:** Pressing the left or right arrow button at either end of any slider will also make the adjustment.*

Black Level Button - Enables the Black Level Slider.

Black Level Slider - Adjusts the black level of the output video signal by moving the slider to the left of center to lower the level or to the right to increase it. An Indicator to the left of the slider shows the current value. The range of the control is +30 IRE to -30 IRE.

Hue Button - Enables the Hue Slider.

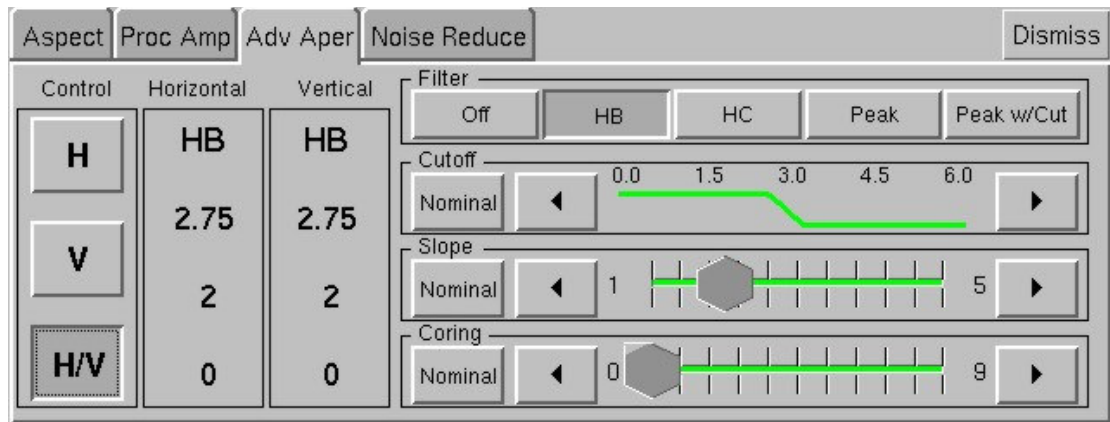
Hue Slider - Adjusts the phase of the output video signal. An Indicator to the left of the slider shows the current value. The range of the control is +9.0 degrees to -9.0 degrees.

Saturation Button - Enables the Saturation Slider.

Saturation Slider - Adjusts the Chroma Saturation of the output video signal. An indicator to the left of the slider shows the current value. The range is +6.0 to -6.0dB.

Advanced Aperture Correction Menu

The Advanced Aperture Corrector allows the user to increase perceived picture sharpness and detail by using a number of specialized filters. The system provides a wide range of filter selections and bandwidth adjustments, which provides the user a creative tool to enhance the look of the material being processed.



Horizontal/Vertical Controls

H (Horizontal) - This button enables the Advanced Aperture filter for use in the Horizontal domain only

V (Vertical) - This button enables the Advanced Aperture filter for use in the Vertical domain only

H/V - This button enables the Advanced Aperture filter for use in both Horizontal and Vertical domain.

Note: Only one of these buttons may be active at any one time.

Different parameters for the Horizontal and Vertical filters can be obtained by selecting one mode and making the adjustments, then selecting the other mode and making adjustments for that. If using the H/V mode, the same adjustments are made to both Horizontal and Vertical filters.

Filters

Off - Turn the Filter off

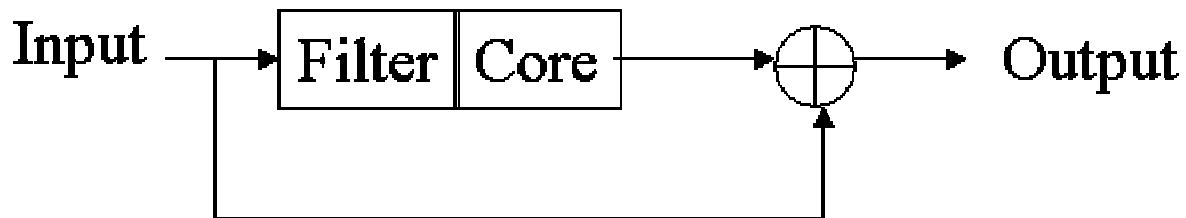
HB (High Boost) - Enables a series of high pass filters that can be used to boost the gain of the system. The frequencies above the cut-off will be boosted by 6dB per octave, up to the Nyquist frequency.

HC (High Cut) - Enables a series of low pass filters that can be used to reduce the gain of the system. The frequencies above the cut-off will be reduced by 6dB per octave.

Peak - Enables a set of band-pass filters. The bandwidth of the band-pass filter is fixed at 0.045.

Peak w/cut - Enables a series of band-pass filters in conjunction with a high frequency cutoff component.

Basic Filter Layout



Filter Controls

Cutoff

This control determines the frequency where the filter's characteristic changes. It has slightly different operation depending on the filter mode being used.

- **High Boost Filter**

In the High Boost filter setting, this control determines the cut-off frequency such that anything above this cutoff frequency is boosted.

For SD sources, the frequency range shown on the menu is 0 to 6 MHz. In this mode there are eight (8) possible frequency settings. The lowest is 1.75 MHz and the highest is 5.1 MHz. With the exception of the highest frequency setting the steps between the available frequencies are 0.5 MHz per step. This results in available frequencies of 1.75, 2.25, 2.75, 3.25, 3.75, 4.25, 4.75 and 5.1 MHz.

For HD sources, the frequency range shown on the menu is 0 to 32 MHz. Here there are also eight (8) possible frequency settings. The lowest frequency is 9.33MHz and the highest is 27.20 MHz. With the exception of the highest frequency setting, the steps between the available frequencies are 2.66 MHz per step. This results in available frequencies of 9.33, 12.00, 14.66, 17.33, 20.00, 22.66, 25.33 and 27.2 MHz.

- **High Cut Filter**

In the HC filter mode this control determines the cut-off frequency such that anything above this frequency is cut.

For SD sources, the frequency range shown on the menu is 0 to 6 MHz. In this mode there are eight (8) possible frequency settings. The lowest is 1.75 MHz and the highest is 5.1 MHz. With the exception of the highest frequency setting the steps between the available frequencies are 0.5 MHz per step. This results in available frequencies of 1.75, 2.25, 2.75, 3.25, 3.75, 4.25, 4.75 and 5.1 MHz.

For HD sources, the frequency range shown on the menu is 0 to 32 MHz. Here there are also eight (8) possible frequency settings. The lowest frequency is 9.33MHz and the highest is 27.20 MHz. With the exception of the highest frequency setting, the steps between the available frequencies are 2.66 MHz per step. This results in available frequencies of 9.33, 12.00, 14.67, 17.33, 20.00, 22.67, 25.33 and 27.2 MHz.

- **Peak Filter**

In the Peak filter setting this control selects one of eight possible band-pass center frequencies.

For SD sources, the frequency range shown on the menu is 0 to 6 MHz. In this mode there are eight (8) possible frequency settings. The lowest is 1.75 MHz and the highest is 5.1 MHz. With the exception of the highest frequency setting the steps between the available frequencies are 0.5 MHz per step. This results in available frequencies of 1.75, 2.25, 2.75, 3.25, 3.75, 4.25, 4.75 and 5.1 MHz.

For HD sources, the frequency range shown on the menu is 0 to 32 MHz. Here there are also eight (8) possible frequency settings. The lowest frequency is 9.33MHz and the highest is 27.20 MHz. With the exception of the highest frequency setting, the steps between the available frequencies are 2.66 MHz per step. This results in available frequencies of 9.33, 12.00, 14.67, 17.33, 20.00, 22.67, 25.33 and 27.2 MHz.

- **Peak w/cut Filter**

In the Peak w/cut filter mode, this control selects one of eight possible center frequencies for the filter. By selecting this center frequency you are also selecting the frequency above which frequencies will be rolled-off, or cut.

For SD sources, the frequency range shown on the menu is 0 to 6 MHz. In this mode there are eight (8) possible frequency settings. The lowest is 1.75 MHz and the highest is 5.1 MHz. With the exception of the highest frequency setting the steps between the available frequencies are 0.5 MHz per step. This results in available frequencies of 1.75, 2.25, 2.75, 3.25, 3.75, 4.25, 4.75 and 5.1 MHz.

For HD sources, the frequency range shown on the menu is 0 to 32 MHz. Here there are also eight (8) possible frequency settings. The lowest frequency is 9.33MHz and the highest is 27.20 MHz. With the exception of the highest frequency setting, the steps between the available frequencies are 2.66 MHz per step. This results in available frequencies of 9.33, 12.00, 14.67, 17.33, 20.00, 22.67, 25.33 and 27.2 MHz.

Slope

This control varies the slope at the filter's transition. It varies from a slope of "1" to "5" where 1 is the most gradual slope and 5 is the most aggressive.

High Boost Filter

The Slope control determines the steepness of the boost of frequencies past the cut-off frequency.

High Cut Filter

The Slope control determines the steepness of the cut of frequencies past the cut-off frequency.

Peak Filter

The Slope control determines the roll-off of frequencies on either side of the center frequency.

Peak w/ cut Filter

The Slope control determines the roll-off of frequencies on the low frequency side of the center frequency.

Coring

This control determines how much of the picture detail is affected by the filter settings above. After all the filters are applied to the image, this new, filtered, image is combined with an original version of the image. The coring setting determines how many of the LSB's (Least Significant Bits) of the filtered output are ignored when combining the filter output with the original image.

A setting of "1" will ignore only the least significant bit from the filter output. A setting of "9" will ignore the 9 least significant bits of the filter output.

Affects on Image Quality

High Boost

This filter will boost the high frequency, or detailed portions of the image giving an overall enhancement to image detail.

High Cut

This filter will cut the high frequency portion of the image resulting in an image that has less detail, and is thus "softer" than the original image.

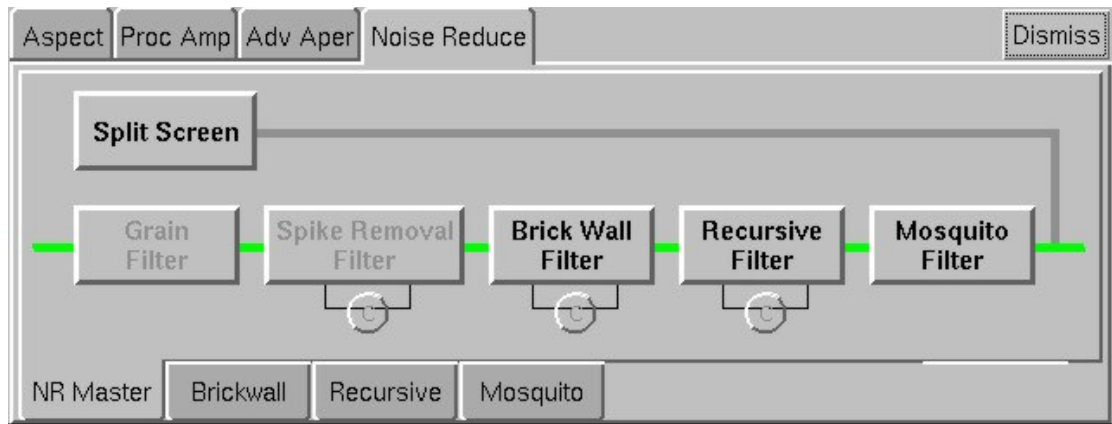
Peak

This filter will enhance a certain frequency range of the image. This will affect some detail areas more than others depending on the frequency range of the detail in those objects and/or areas.

Peak w/cut

This filter combines the effects of the High Cut and Peak filters and thus creates an image where certain details within a range will be enhanced and all details above the range (i.e. having a higher frequency) will be reduced, or smoothed.

Noise Reduce - Master Menu



Operation

The **Master** menu displays which filters are currently engaged in the imageEnhance system and how the output signal to a monitor could be displayed.

The filter block order and the highlighted data paths on the diagram indicate the processing flow through the system. Filters that are enabled are shadowed in the display. Tabs at the bottom of the display allow the user to access the detailed parameter control menu for any of the specific filters.

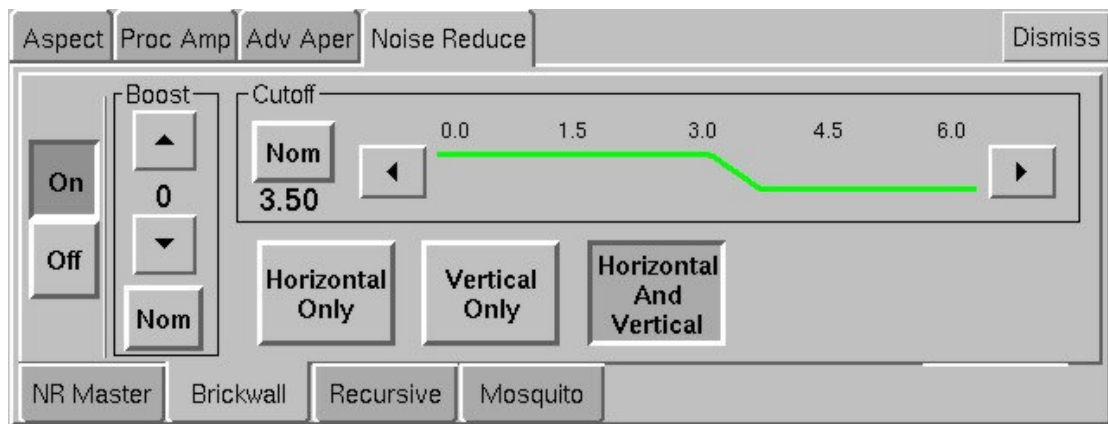
The Master menu permits the operator to enable or disable any of the noise reduction filters by selecting the corresponding button, or buttons. By selecting more than one filter, the effects of the filters may be cascaded, yielding the maximum desired level of noise reduction in one pass. By selecting a tab at the bottom of the Master menu, the operator can access and adjust the detailed controls for each filter, as described in following sections.

***Note:** The signal flow diagram of the NR Master menu does not show the Enhance filter. This filter is located after any of the filters shown on this menu, but is affected by the split screen function.*

User Adjustable Parameters

- **Split Screen** - divides the image vertically. The left half of the image will be unprocessed, while the right half of the image will show the effects of the processing filters.

Brickwall Filter



Operation

This noise reducer is a low pass filter with a sharp cutoff. A low pass filter attenuates high frequencies (i.e. image detail) while leaving low frequency information unaffected. Impulse and Gaussian noise contain high frequency components, and will be diminished when the Brickwall filter is ON. A convolution template is dynamically generated from the user inputs. The filter is applied by processing each pixel in the image with this convolution template.

This filter is primarily intended for pre-compression processing, to attenuate high frequency information that will normally be quantized away in the compression process. When the Brickwall Filter is used as a pre-compression processor, it can improve the efficiency and quality of the compression process. Removing some of the high frequency information in a controlled manner before compression has several benefits to the compressor. For example, the compressor will have more bits to spend when generating the compressed stream, since there will be less information to compress. Also, the potential for loss of desirable information due to the compressor's spending too many of its available bits on small details is decreased, resulting in a more consistent output.

User Adjustable Parameters

Cutoff (MHz) - Sets the cutoff frequency for Brickwall Filter. Information with a frequency greater than the cutoff value will be filtered, while information with a frequency less than the cutoff value will be left alone. The cutoff frequency is represented graphically by the center of the downward slope on the green line.

The numerical value of the cutoff frequency is located immediately to the right of the cutoff label. The range of the control is 0.9 to 5.5 MHz with 21 defined frequencies. The nominal value of cutoff is 3.5 MHz.

The list of defined Standard Definition frequency settings for the cutoff is shown below. The nominal value is shown in bold.

- 0.9, 1.0, 1.25, 1.50, 1.75, 2.0, 2.25, 2.5, 2.75, 3.0, 3.25, **3.5**, 3.75, 4.0, 4.25, 4.5, 4.75, 5.0, 5.25, 5.5

Note: *Pressing the left of right arrow button at either end of the graph will move the cutoff frequency to the next higher or lower defined frequency.*

Horizontal Only - the filter will only affect the picture in the horizontal axis.

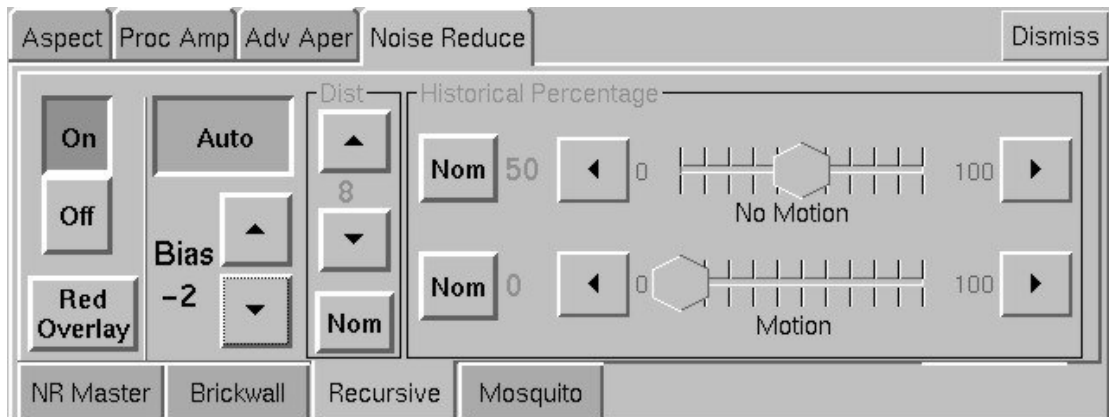
Vertical Only - the filter will only affect the picture in the vertical axis

Horizontal And Vertical - the filter will be applied to both horizontal and vertical axis. The Cutoff and Boost parameters apply to both axes.

Boost - Sets the amount of boosting of amplitudes prior to the cut-off frequency for Brickwall Filter. This boosting of the amplitudes gives the appearance of sharpening in the image to help compensate for blurring that occurs when filtering out high frequency information. The range of the control is 0 to 4 dB. The nominal value for this parameter is "0".

Note: *pressing the arrow button above or below the boost value will make adjustments in increments of 1 dB.*

Temporal Recursive Filter



Operation

This Noise Reducer is a motion adaptive temporal recursive filter that works well in removing random and Gaussian noise. Each pixel is labeled as motion, no motion, or noise. Each of these classes of pixels is treated differently in the noise reduction process. For pixels in which there is no motion, low-level Gaussian noise may be reduced via temporal processing by a weighted averaging over successive frames. For pixels labeled as random noise, spatial processing replaces these pixels. Pixels labeled as being "in motion" are retained "as is" to avoid artifacts that may be introduced through temporal processing.

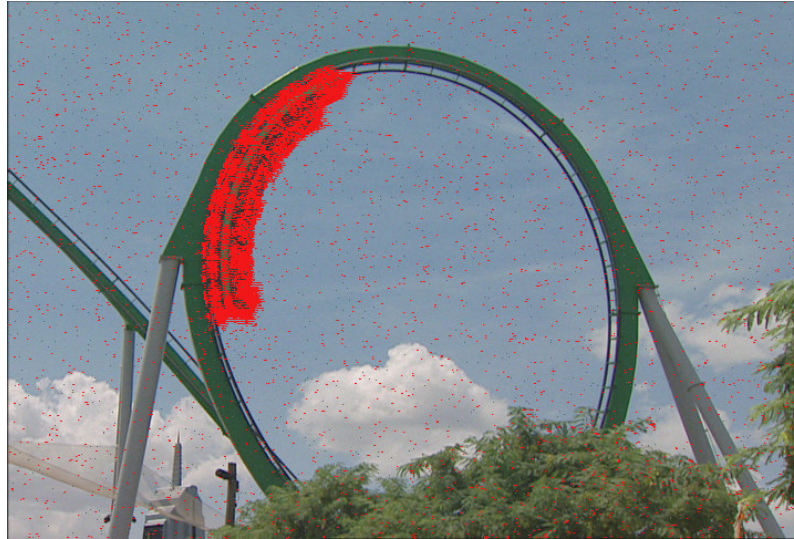
The Temporal Recursive Filter also has an "Auto" mode for providing better operation in all modes.

User Adjustable Parameters - Manual or Auto Mode

- **On/Off** - Turn this filter on or off.
- **Red Overlay Button** - When this button is selected, the system superimposes a red overlay onto areas in the input image where the temporal recursive filter will identify motion. The red overlay would display what the system is not 'attacking' or filtering.

Note: The "Red Overlay" button should not be used in combination with any other overlay button.

In the Temporal Recursive Filter, the red overlay will show the pixels in the image that have been determined to be in motion. In Auto mode, these pixels will not have any noise reduction applied to them. In manual mode they will have noise reduction applied according to the setting of the Motion, Historical Percentage slider.



In Auto mode the red overlay will help to identify the pixels in the image, which are being processed by the temporal recursive filter. In manual mode it can help in adjusting the Distance control. The Dist Button is used to set the *distance* threshold to determine the sensitivity to motion between the current frame and historical frames. This threshold represents a percentage of the current pixel value that the historical pixel value must be within in order to be considered "unchanged". The Distance control should be set to a point where only pixels that are actually in motion are colored red. This will allow noise to be correctly processed as noise rather than motion.

User Adjustable Parameters - Manual Mode (Temporal Recursive Filter)

- **Dist Button** - Sets the distance threshold to determine the sensitivity to motion between the current frame and historical frames. This threshold represents a percentage of the current pixel value that the historical pixel value must be within in order to be considered "unchanged". The **Dist** button is fully operational in this mode so the user can identify the motion sensitivity of this control, and better control it's setting. The current value is displayed in the center of the button. The range of the control is 0 to 40. The nominal value for this Dist threshold is 15.

A Dist setting of 0 will detect motion at every pixel, the impact being that no filtering will occur. A Dist setting of 40 will be less sensitive to motion, temporally filtering every pixel, which may result in blurring of any objects/areas that are in motion. In other words, if Dist is too low, it thinks everything is moving, therefore no filtering. If Dist is too high, it thinks nothing is moving, therefore filtering everything

Note: *Pressing the top or bottom arrow button will make adjustments in increments of a single value.*

- **Historical Percentage: No Motion NR Slider** - Sets the historical weighting factor for areas in the frame where no motion has been detected. An indicator to the left of the slider shows the current value. The range of the control is 0 to 100.

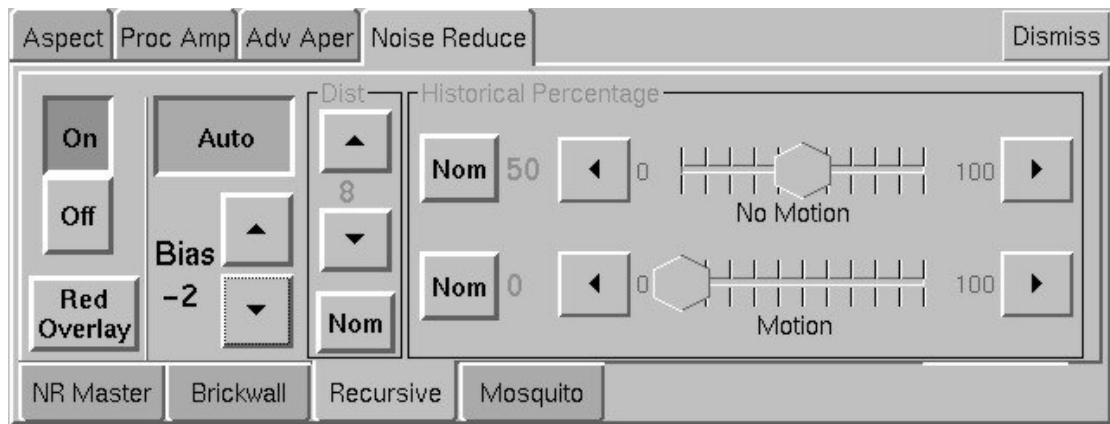
A setting of 100 forces the filter to use only historical data in areas where no motion has been detected. A setting of 0 forces the filter to use only current data in areas where no motion has been detected. The nominal setting for this slider is 75.

- **Historical Percentage: Motion NR Slider** - Sets the historical weighting factor for areas in the frame where motion has been detected. An indicator to the left of the slider shows the current value. The range of the control is 0 to 100. A setting of 100 forces the filter to use only historical data in areas where motion has been detected.

A setting of 0 forces the filter to use only current data in areas where motion has been detected. The nominal setting for this slider is 0.

Note: *Pressing the left or right arrow button at either end of these sliders will make adjustments in increments of a single value.*

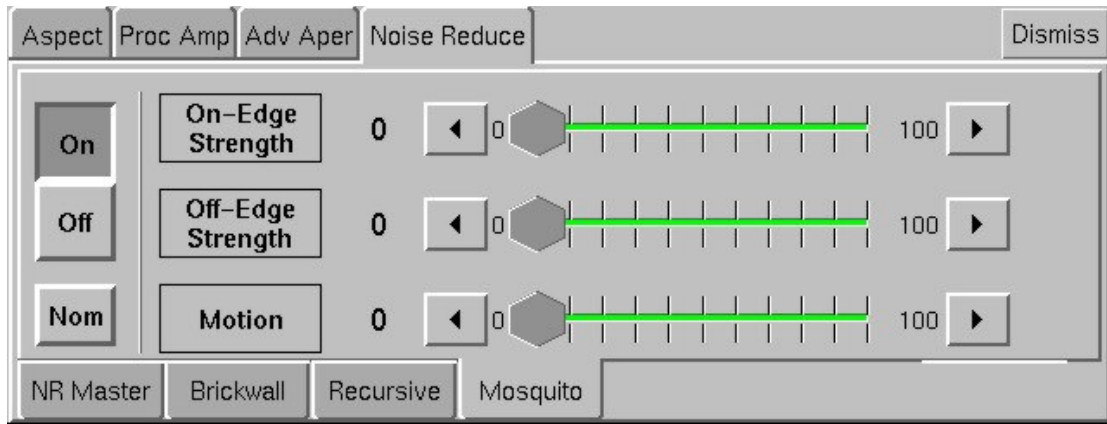
User Adjustable Parameters - Automatic Mode (Temporal Recursive Filter)



- **Auto Button** - Engages a feedback controller that dynamically sets the distance, no motion and motion sliders based on noise and motion measurement extracted from the scene. Setting this button will disengage the distance, no motion and motion sliders.
- **Bias Button (Only used in Auto Mode)** - Adjusts the noise set point in the temporal recursive controller. The higher the bias, the more aggressive the controller is towards noise in the scene. The lower the bias, the more sensitive the controller is towards motion in the scene. The range of the bias control is -6 to +6, with a nominal setting of 0.

Note: Pressing the top or bottom arrow button will make adjustments in increments of a single value.

Mosquito



Operation

The Mosquito filter is designed to minimize the artifacts that are created by modern compression technologies. Those artifacts typically show up as blocks of information with sharp differences at the edges of those blocks. Use this filter to minimize the visibility of these artifacts by adjusting for the filtering at the edge of the block, away from the edge of the block, and by determining how to handle areas in motion.

User Adjustable Parameters

- **On Edge Strength** - Adjust the strength of the mosquito noise filter as applied to vertical edges in the image. As the strength is increased the mosquito artifacts around the edges will decrease. This will also cause the detail in the edges to soften
- **Off Edge Strength** - Adjust the strength of the mosquito noise filter as applied to areas of the image away from vertical detail. As the strength of the filter is increase it decrease mosquito noise that may be occurring away from sharp vertical. This will have the effect of softening the overall image.
- **Motion** - Determines how the mosquito filter is applied in areas of motion. As the setting is increased the filter will be applied more aggressively to moving areas in the image.

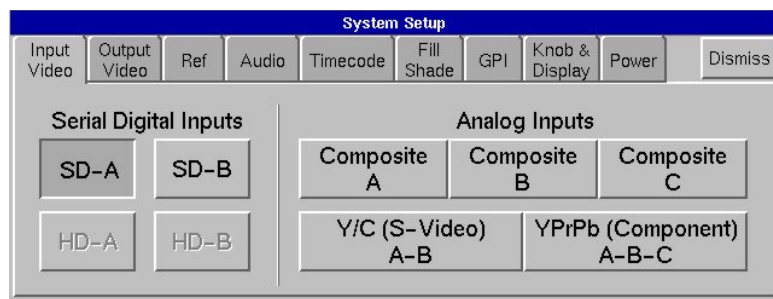
System Setup Menu

The *System Setup Menu* allows the user to verify installed options, setup GPI's, choose the Genlock Reference Source and perform other basic setup functions.

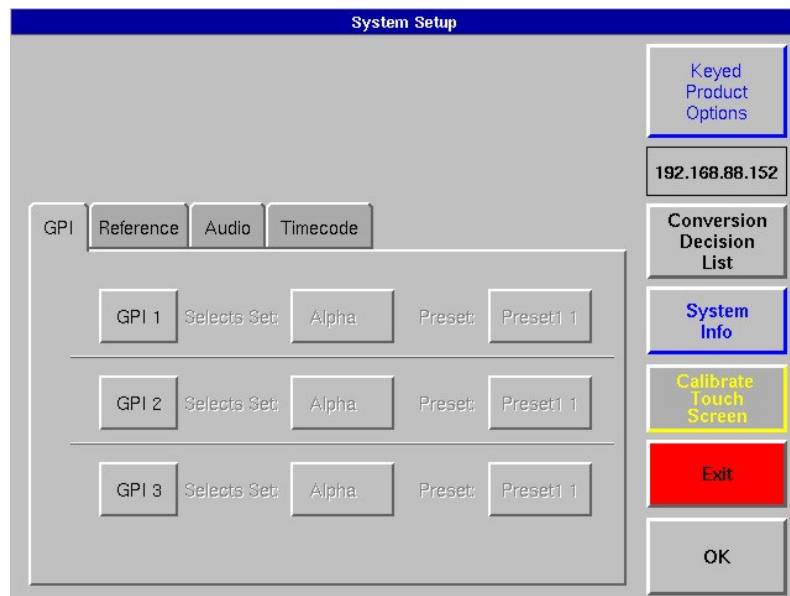
A "tabbed" layout offers access to setup options for GPI control, Genlock Reference inputs, Audio processing and Timecode conversion, Input Selection and setup of the user control knob.

Some of the menu items on the 2RU are specific to this platform, but most of the menus are common. The menus that are specific to the 2RU are noted in the heading for that menu.

The System Setup Menus for the 2RU and 3/6RU are shown below.

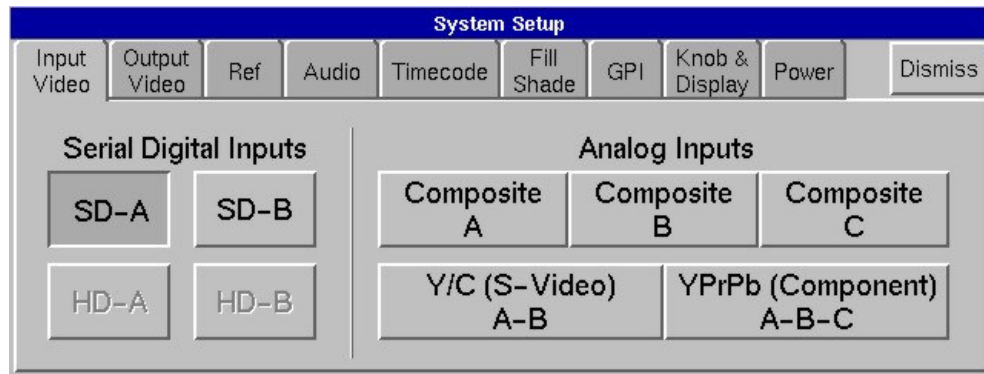


2RU



3/6RU

Input Video Menu - 2RU



Serial Digital Inputs

SD-A - Select standard definition, SDI input A

SD-B - Selects standard definition, SDI input B

HD-A - Select high definition, HD-SDI input A

HD-B - Selects high definition, HD-SDI input B

Note: HD-SDI input on the 2RU Video Computer is not currently supported

Analog Inputs

Composite A - Select analog composite input A

Composite B - Select analog composite input B

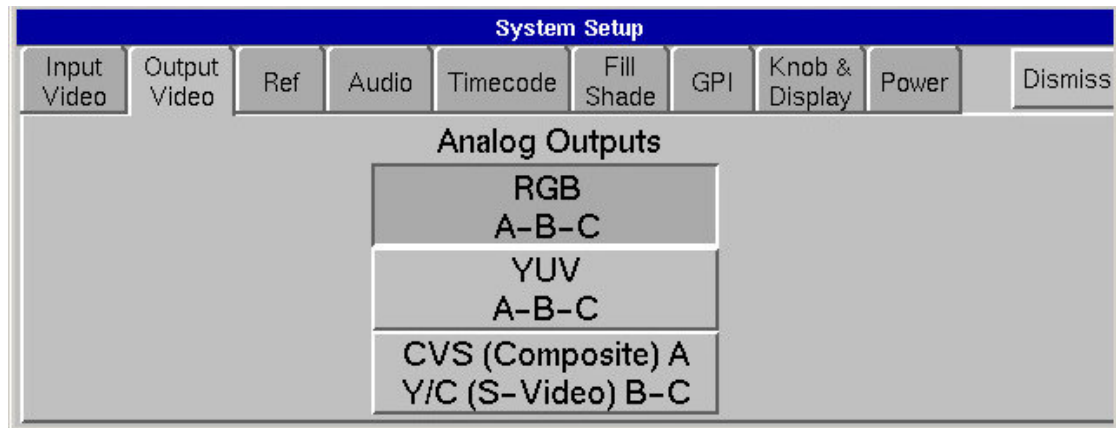
Composite C - Select analog composite input C

Y/C (S-Video) A-B - Select the S-video input, which is achieved by connecting the Y-channel to input A and the C-channel to input B.

YPrPb (Component) A-B-C - Selects the analog component input. The Y-channel is connected to input A, the Pr-channel is connected to input B, and the Pb-channel is connected to input C.

Note: Analog composite and component are only supported on the 2RU Video Computer

Output Video Menu - 2RU



Analog Outputs

RGB A-B-C - Sets the analog component output for RGB.

YUV A-B-C - Sets the analog component output for YUV.

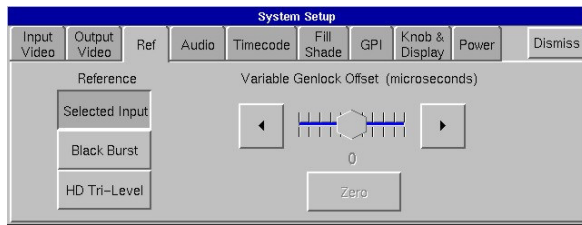
CVS (Composite) A / Y/C (S-Video) B-C - Sets the analog output to provide standard definition analog composite on output A and S-video on outputs B and C.

Note: Analog composite and component outputs are only available on the 2RU Video Computer

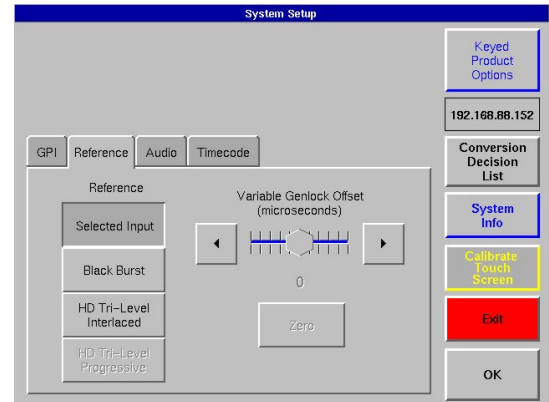
The Output Video Menu only affects the analog video outputs. Regardless of the setting on this menu, the SDI output of the system will be present in either a standard definition or high definition format depending on the output format chosen.

Reference

This menu allows the user to select the desired output reference source:



2RU



3/6RU

Reference Menu Options:

- **Selected Input** will reference the unit to the currently selected input.
- **Blackburst** will reference the unit to an external SD analog black burst signal.
- **HD Tri-Level** will reference the unit to an external HD tri-level sync signal.

Note - The Reference frame rate must match the output frame rate.

Note - Tri-level Sync is invalid when a Standard Definition (SD) output is selected.

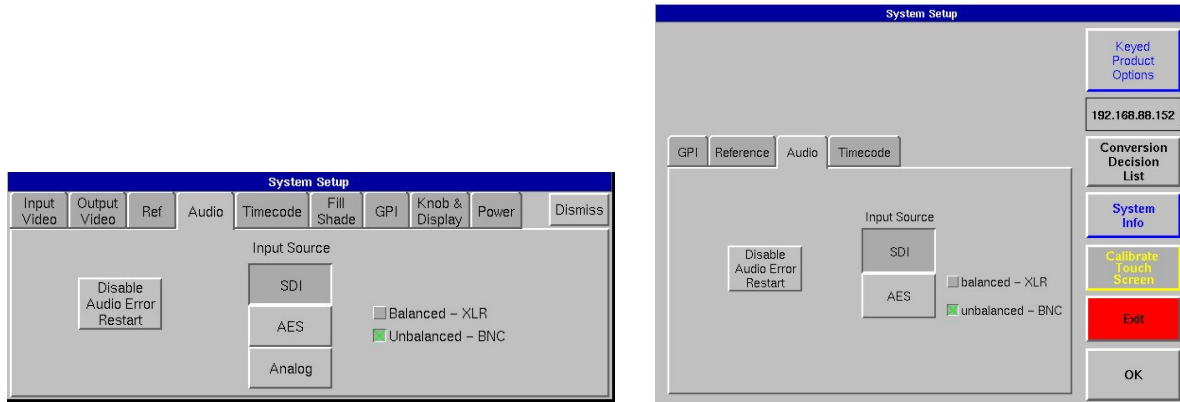
Reference Menu Error Indications:

The color of the Reference Tab will indicate the status of the reference signal.

- **GRAY** - an input is present and valid.
- **YELLOW** - the unit has detected an input signal, but it is not valid based on the currently selected input format.
- **RED** - indicates that no input has been detected.

Audio

The Teranex System will process and synchronize embedded or discrete AES audio and video.



2RU

3/6RU

- **SDI - Input source (Embedded Audio Processing & Delay)**
Embedded audio processing and delay have been implemented in all formats.
- **AES - Input Source (Discrete Audio Processing)**
Discrete audio handling has been implemented in all format conversions.
- **ANALOG - Input Source (Analog Audio Processing & Delay)**
Analog audio is available only on the 2RU system. The analog is balanced, with 3-pin XLR connectors used for input and output.
- **Disable Audio Error Restart**
This button will only be visible if the VC-6 Video Computer is fitted with a Rev 3 Nevado Input/Output board, or a Rev. 2 Nevado board fitted with embedded Audio delay handling firmware.

If there is an error in the embedded audio stream of the incoming signal, or if one or more of the audio channels is blank, the Video Computer will typically reinitialize the conversion application in an attempt to recover from this error. This re-initialization will have an adverse effect on the video output of the unit as well.

The "Disable Audio Error" function allows the Video Computer to ignore the audio error and process both signals as if no errors were present. The quality of the embedded audio may not be optimal, depending on the nature of the input error. The Disable Audio Error Restart button simply instructs the Video Computer to ignore any errors present.

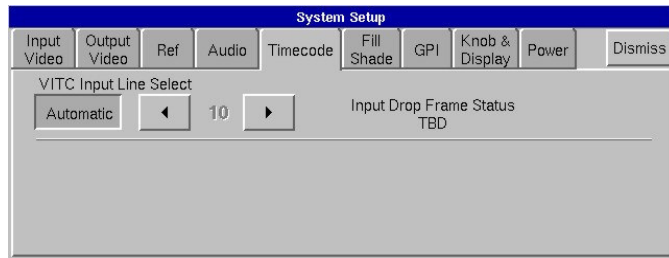
Audio Menu Error Indications:

The color of the Audio Tab will indicate the status of the audio signal.

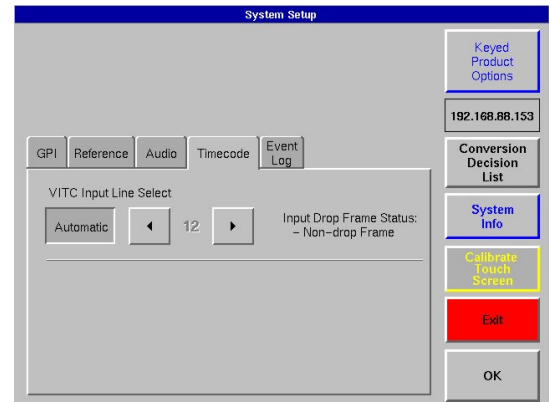
- GRAY - an input is present and valid.
- YELLOW - the unit has detected an input signal, but it is not valid based on the currently selected input format.
- RED - indicates that an error in the AES audio has been detected.

Timecode

Timecode translation has been implemented in all format conversions. The timecode menu allows the user to select between automatic detection and user specified VITC input line selection.



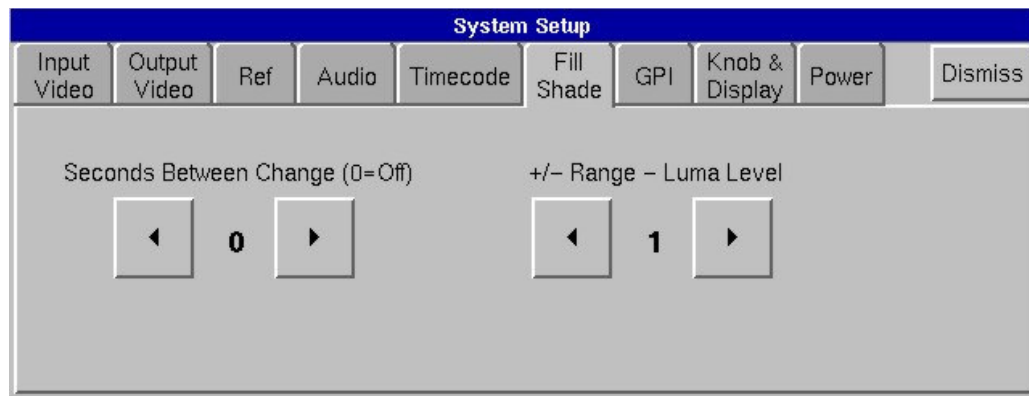
2RU



3/6RU

- **Automatic Detection**
In automatic mode, the video computer will look at lines 10 - 20 in the vertical interval to see if it can detect a valid timecode signal. An indication is present on the menu to show whether the incoming timecode is drop frame or non-drop frame.
- **User Defined (for SD inputs Only)**
In manual mode, the user must select the line on which the timecode will be located. The GUI allows the user to select lines 10 - 20. An indication is present on the menu to show whether the incoming timecode is drop frame or non-drop frame.

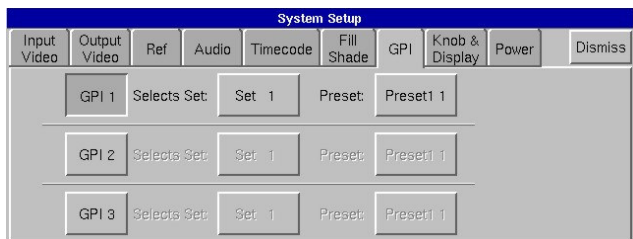
Fill Shade - 2RU



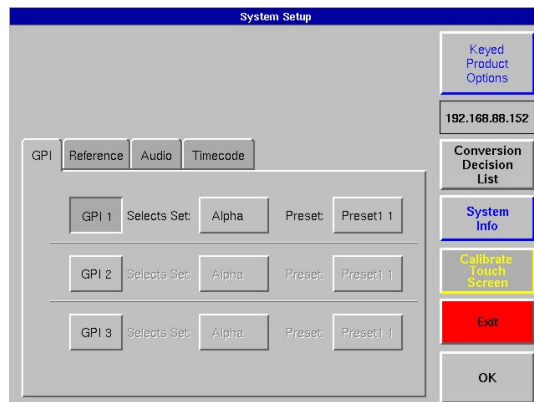
The Dynamic Fill Shade feature is not available in imageEnhance applications.

GPI Menu

The Teranex Video platform can receive up to three General Purpose Interface (GPI) triggers to automatically activate specific User Presets. (For more information on Presets, see Preset section in this manual.)



2RU



3/6RU

General Purpose Interface (GPI) Setup:

1. Select the GPI Tab in the System Setup menu (see below)
2. Select the desired GPI button on the touchscreen - **GPI 1, GPI 2 or GPI 3**
3. Select which group of the 8 presets you wish to use (Set 1- Set 8).
4. Select the specific User preset (Preset 1-5) within the group specified in step 3.

Note: If the user has named the User Groups or Presets, the names will be displayed as appropriate.

The GPI inputs are held "high" and expect a contact closure to ground to activate the programmed preset. Outputs are at +5VDC normally, and drop to an active "low" when activated. There is a 100ma maximum sink to ground.

Pin-out Designations for 25-pin D-Style Female GPI connector:

PINS	SIGNALS
1	GPI INPUT #1
2	GPI INPUT #2
3	GPI INPUT #3

PINS	SIGNALS
4 - 13	Not connected
14 - 19	System Ground
20 - 25	Not connected

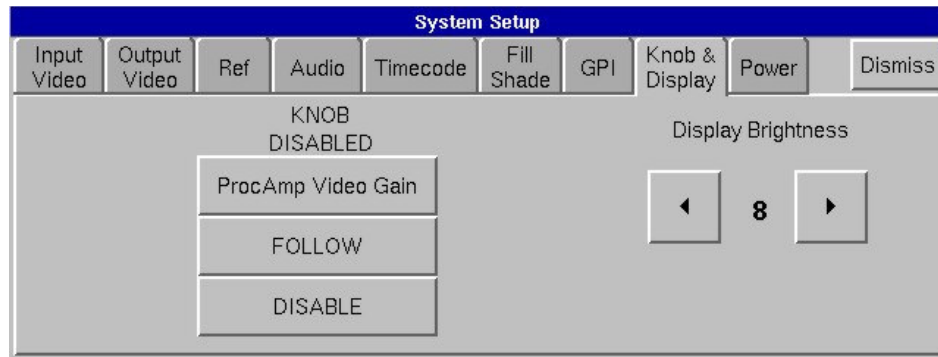
Pin-out Designations for 9-pin D-Style Female GPI connector:

PINS	SIGNALS
1	GPI INPUT #3
2	GPI INPUT #2
3	GPI INPUT #1

PINS	SIGNALS
5 & 6	System Ground
7	Not Connected
4, 7-9	Reserved

Knob & Display - 2RU

On the 2RU chassis the Knob & Display menu allows access to program the functionality of the single knob that is available on that chassis. This menu also allows the user to adjust the brightness of the GUI display.



Programming the knob:

The operational mode of each knob can be set independently. There are three modes that are selectable via the pull-down menus activated by pressing the Left Knob or Right Knob Buttons:

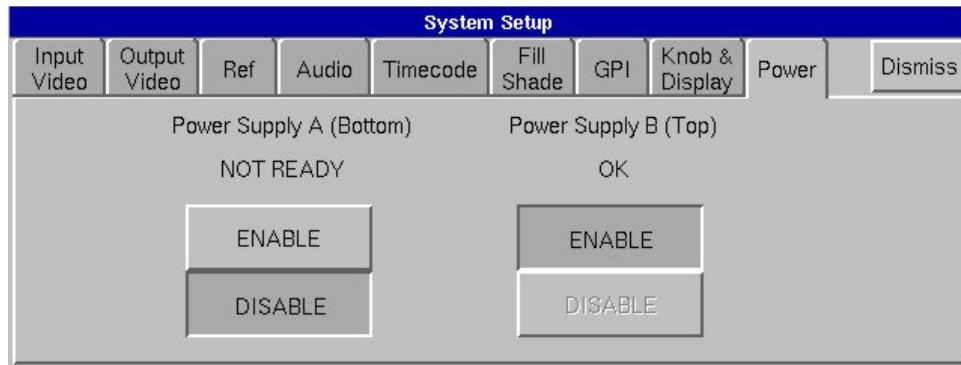
Knobs can be in the following modes:

- **Deprogrammed** - The knob is disabled.
- **Follow Mode** - The knob can be assigned 'on the fly.' When the user activates a slider control within one of the menus and then turns a knob, the knob is automatically assigned to that function. If the user then selects another slider control and retouches the knob, the knob will be re-assigned to the new function.
- **Assigned** - Locks a knob to a particular function (e.g.- Proc Amp Video Level). The knob retains this function even when the GUI screen is changed to another mode. To assign a function to a knob, activate the desired slider and then select the "Assigned" mode for the desired knob. The knob will continue to control only this function until the knob is reassigned to Follow Mode or Deprogrammed.

Adjusting the Display Brightness

The front panel display brightness can be adjusted from this menu. The minimum value is "1" and the maximum value is "8". The nominal value is "6".

Power Menu - 2RU



When equipped with the optional redundant power supply, this menu is used to enable or disable one of the two power supplies installed in the system.

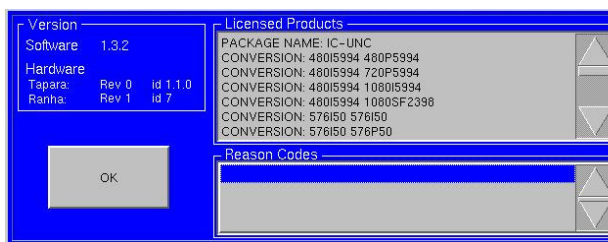
In addition to allowing control of the two power supplies, the current status of each power supply is shown above the Enable/Disable buttons for that power supply. The power supply status will be one of the following:

- **OK** - Power Supply is operating properly
- **NOT READY** - there is no power supply in this location
- **POWER SUPPLY OVER TEMP** - this power supply is operating at or above the maximum operating temperature for this supply
- **Fan Failure** - this status occurs when any of the fans in the system - either those that are in the power supplies, or those in the chassis itself - run too slowly, or have stopped.

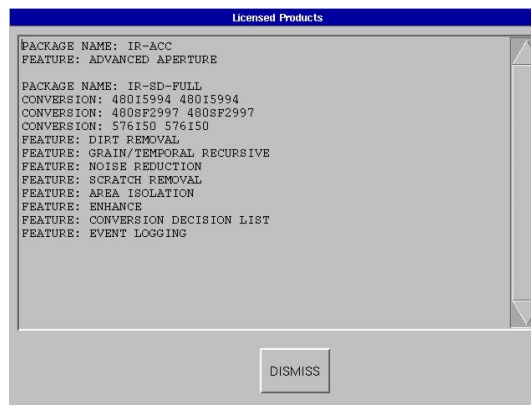
Keyed Product Options

On the 3/6RU systems pressing the “Keyed Product Options” button opens a window displaying a list of software packages activated by the Access Key as shown below. Use the scroll bar at right to scan all packages and conversions in the list. When finished, press the “DISMISS” button to return to the System Setup menu.

On the 2RU system, the Licensed Products list is part of the System Info menu that appears after pressing the System Info button on the System Setup menu. When finished, press the “OK” button to return to the System Setup menu.



2RU

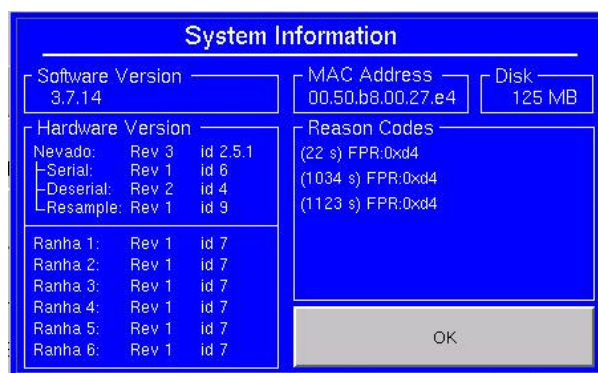


3/6RU

System Info



2RU



3/6RU

The System Info menu displays software and hardware information about the system.

2RU

On the 2RU, there are only two boards - the Tapara and the Ranha board - and the versions and id's of these two boards are shown in the System Info menu along with the software version that is currently installed on the system. This menu also shows the list of licensed products that have been installed on this system. The area marked "Reason Codes" is for engineering use only.

Note: The System Info menu on the 2RU does not show the MAC Address of the system. This information is only available by pressing the "System Info" button on the Startup Menu.

3/6RU

On the 3/6RU, there can be as many as 6 Ranha boards and one Nevado board. The Nevado board can have up to three daughter cards - the serializer card, the Deserializer card and the resampler card - the revisions and id's of all these boards are shown in this menu.

This menu also shows the MAC Address of the system, which is needed when obtaining keys for new software features and the size of the disk that is installed on the CPU board that controls the system.

In addition to the hardware revision information, the menu shows the software version that is currently installed on the system.

The area marked "Reason Codes" is for engineering use only.

Conversion Decision List

The Conversion Decision List (CDL) is an optional software package that gives the user the ability to control the unit via a text-based script where timecode-triggered events control various parameters of the unit.

To access the CDL Menu, press the "Conversion Decision List" button, located on the right side of the System Setup Screen.

Conversion Decision List	
CDL 1	CDL 5
CDL 2	CDL 6
CDL 3	CDL 7
CDL 4	CDL 8

CDL File: 1
State: Stop
Line Queued: 0
Current Time: NOT AVAILABLE
Time Queued:
Next Time:
Status: OK
Error Line: 0

Run
Stop
Edit
Exit

2RU

Conversion Decision List	
CDL 1	CDL 5
CDL 2	CDL 6
CDL 3	CDL 7
CDL 4	CDL 8

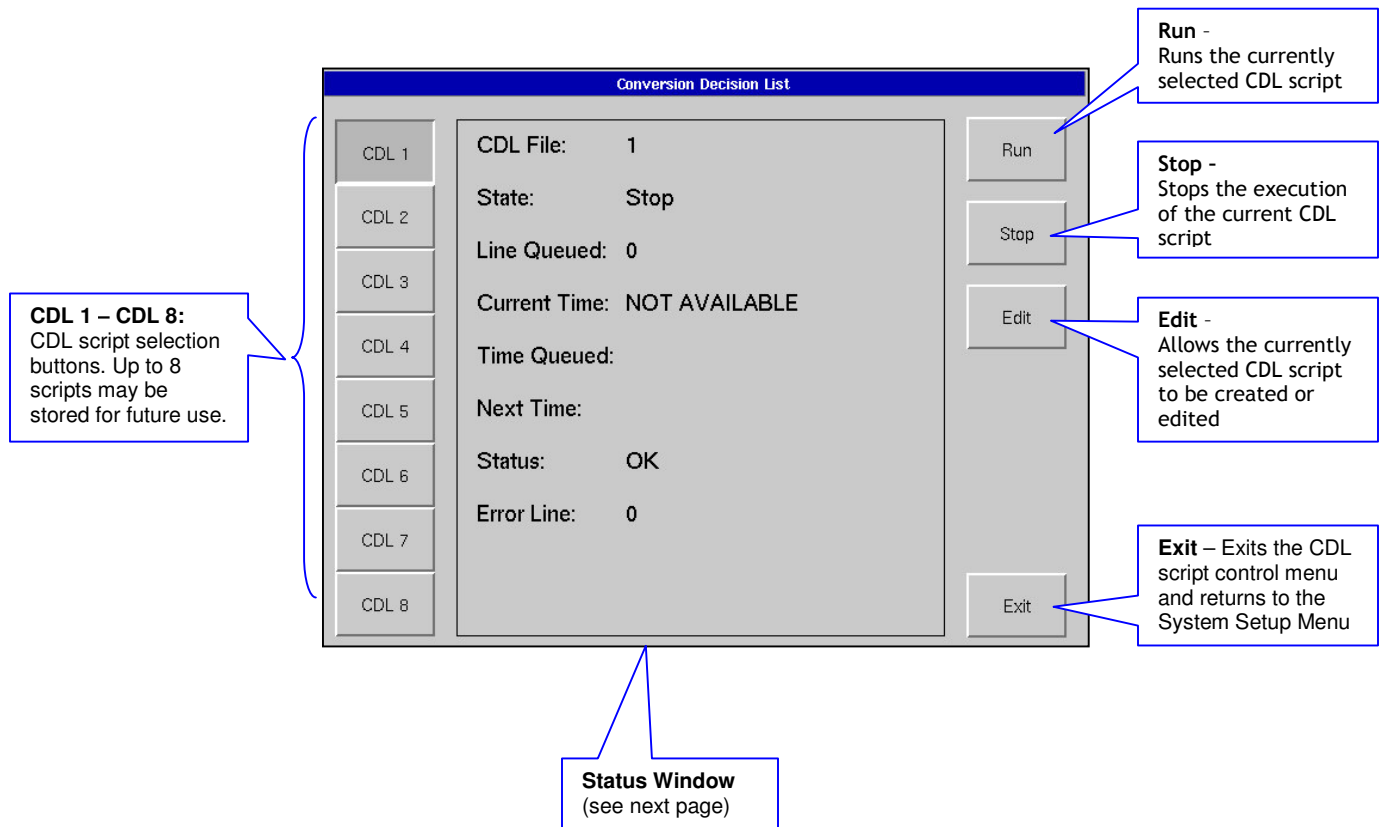
CDL File: 1
State: Stop
Line Queued: 0
Current Time: NOT AVAILABLE
Time Queued:
Next Time:
Status: OK
Error Line: 0

Run
Stop
Edit
Create
Exit

3/6RU

Conversion Decision List Menu

The Conversion Decision List menu is shown below.



Status Window - Provides the following information about the currently selected CDL script:

- **CDL File:** The number of the currently selected CDL script (CDL 1 - CDL 8).
- **State:** Indicates whether the script is stopped or running
- **Line Queued:** Indicates which line in the script is set to run next
- **Current Time:** This is currently not available and will show 'NOT AVAILABLE'
- **Time Queued:** The timecode number of the next event in the list
- **Next Time:** The timecode number for the next event scheduled after the current
- **Status:** Shows the current status of the CDL processing
- **Error Line:** If an error occurs in the CDL script, the line number containing the error will be displayed here. If a script has multiple errors, only the line number of the first error detected will be displayed.

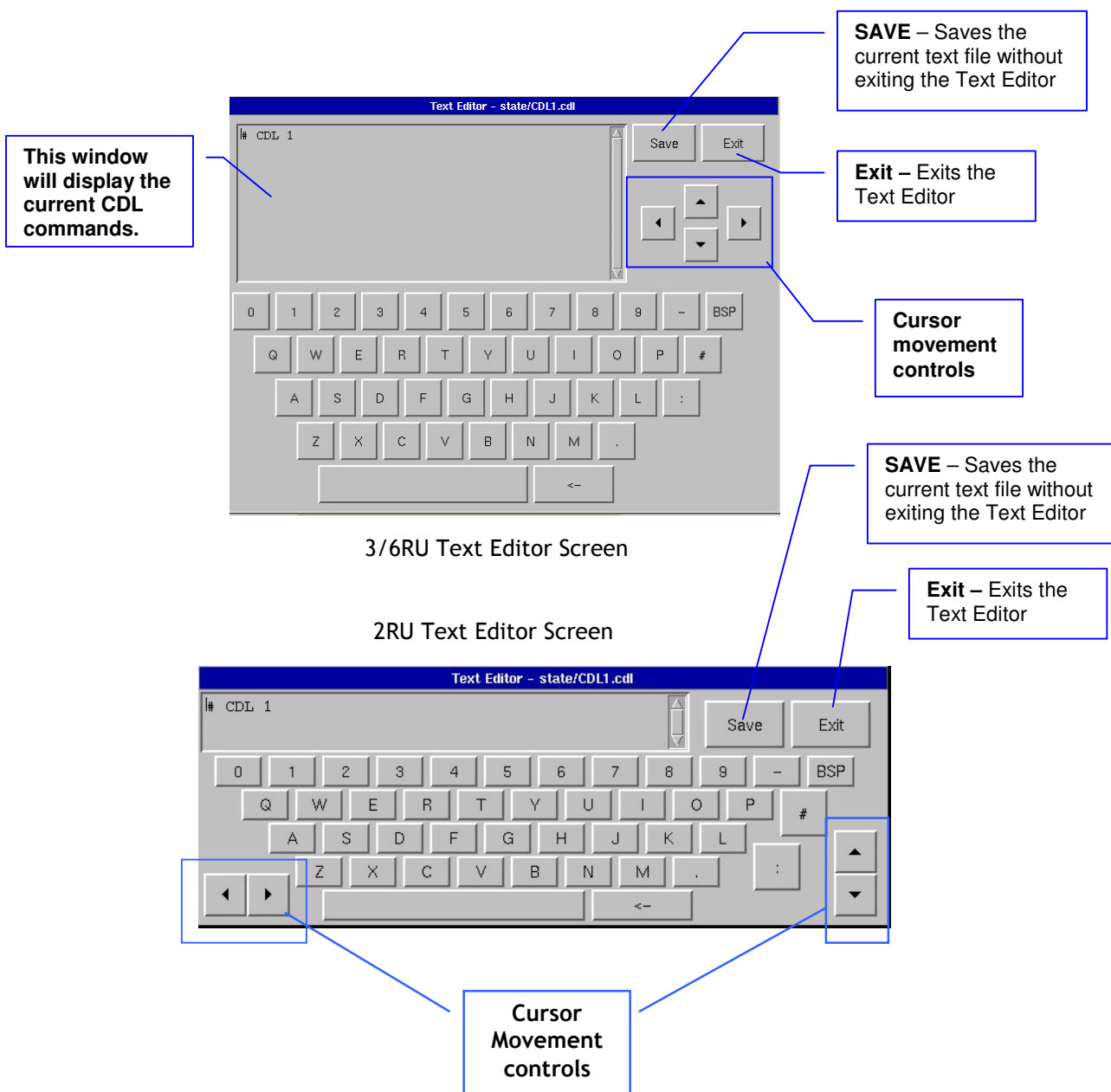
Conversion Decision List Operation

Script - Run

To run a script, select the desired script button (CDL 1 - CDL 8) and press Run. A script can be stopped at any time by pressing the Stop button.

Script - Edit / Create

The CDL scripts are created through the use of a built-in text editor. To create or edit a script, press the desired script button (CDL 1 to CDL 8) and press Edit. The screen below will then be displayed:



CDL Example

The syntax for CDL commands is outlined in the Teranex Remote API Document. A copy will be provided when this option is purchased, or upon request.

An example of a script for StarFilm would be:

```
TC AT 01:00:00.00
DIRT OFF OFF OFF
GRAIN OFF
TRF OFF
TC AT 01:05:00.00
DIRT 80 OFF 16 0
GRAIN 20 MEDIUM
TC NEXT
GRAIN 30 MEDIUM
TRF ON ON -2
TC NEXT
GRAIN 30 SMALL
TC NEXT
GRAIN 50 SMALL
TC DONE
```

In the example above, when the incoming timecode reaches:

01:00:00.00 (1-hour) the system will set the dirt concealment, grain reduction, and temporal recursive filter to off.

01:00:00.05 (1-hour, 5-frames) Dirt concealment is turned, black and white contrast adjustments are set to 80, chroma aided is turned off, the size control is set to 16 and motion sensitivity is set to 0. The grain reduction filter is turned on, the aggressiveness is set to 20 and the size to medium.

01:00:00.06 (1-hour, 6-frames) in the next frame the grain reduction aggressiveness is set to 30. The temporal recursive filter is turned on and set to Auto mode with a bias of -2.

01:00:00.07 (1-hour, 7-frames) In the next frame the grain reduction size is set to small.

01:00:00.08 (1-hour, 8-frames) In the next frame the grain reduction aggressiveness is set to 50 and the script is ended.

Note: *While a script is running the user does not have access to the normal control menus of the unit. To go back to the normal GUI interface, press the Exit button on the CDL screen.*

A simple way of implementing parameter changes at certain timecodes is to implement one or more presets that capture the settings for certain scenes. Then create a simple CDL that just invokes the preset at the appointed timecode.

Offline Script Editing

It is also possible to create scripts outside of the Video Computer and then send them to the unit via a telnet session. Once a telnet session has been established, follow the commands for Read and Write as outlined in section 4.6 of the Teranex Remote API document.

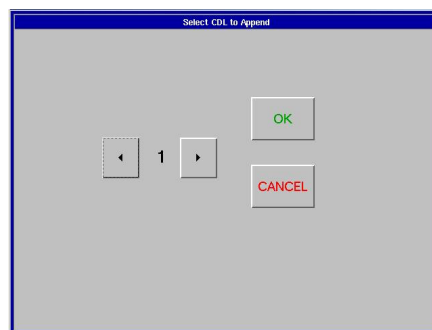
Enhanced CDL (3/6RU only)

Enhanced CDL is a more automated way of generating timecode based conversion decision lists. Instead of manually entering in timecode and parameter change commands, Enhanced CDL actually builds the CDL script based on the application parameters at specific timecode locations. In essence, the Enhanced CDL feature captures all the application settings at various key frame locations. Using this feature relies on having incoming VITC timecode coming into the system with the video.

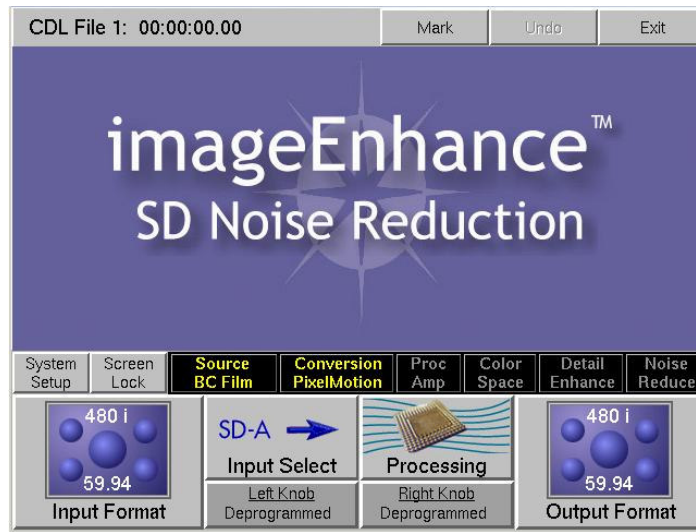
The Enhanced CDL capability is invoked using the Set Select button in Area 1 of the display and choosing the "CDL Marking" button. This is shown on the illustration below.



This will bring up a menu for selecting the CDL script to append.



Once the CDL script has been selected, Area 1 of the screen - where the presets are normally located - will be replaced by the CDL Marking bar.



At this point, content can be reviewed and adjustments made to the software to achieve the desired results at specific timecode locations. Once the adjustments are correct, press the "Mark" button on the CDL Marking Bar.

Use the "Undo" button to remove a captured timecode event and use the "Exit" button to exit the CDL marking feature.

Once the CDL script has been created using the Enhanced CDL feature, the CDL script can be run in the normal fashion as documented in the previous pages.

Exit

Pressing the Exit button will bring up the **Start-Up Screen Menu** (App selection, Upgrade from CD, Calibrate touchscreen, Edit IP and System Info).

OK

Pressing OK returns you to the Application Splash Screen.